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Electrical World

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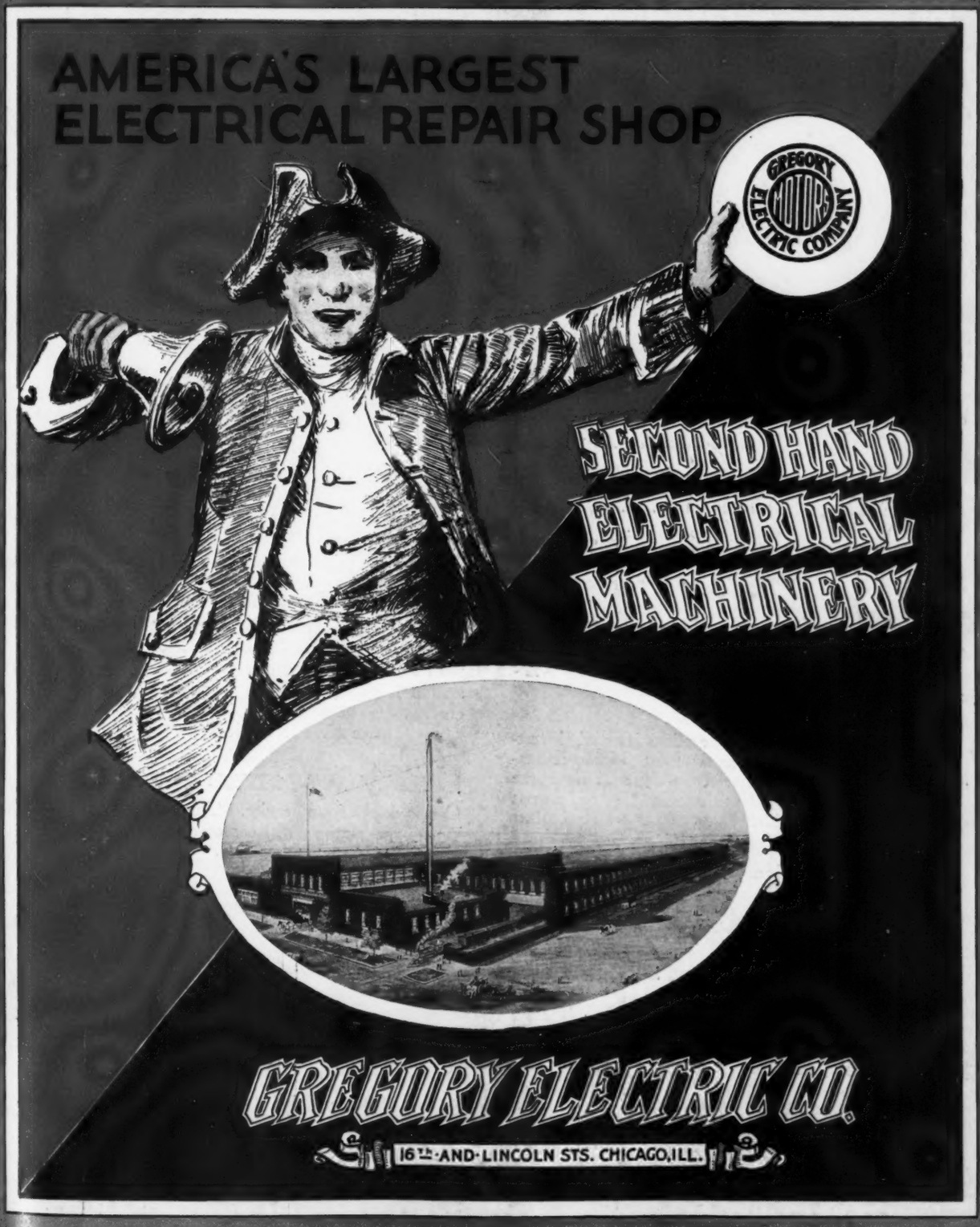
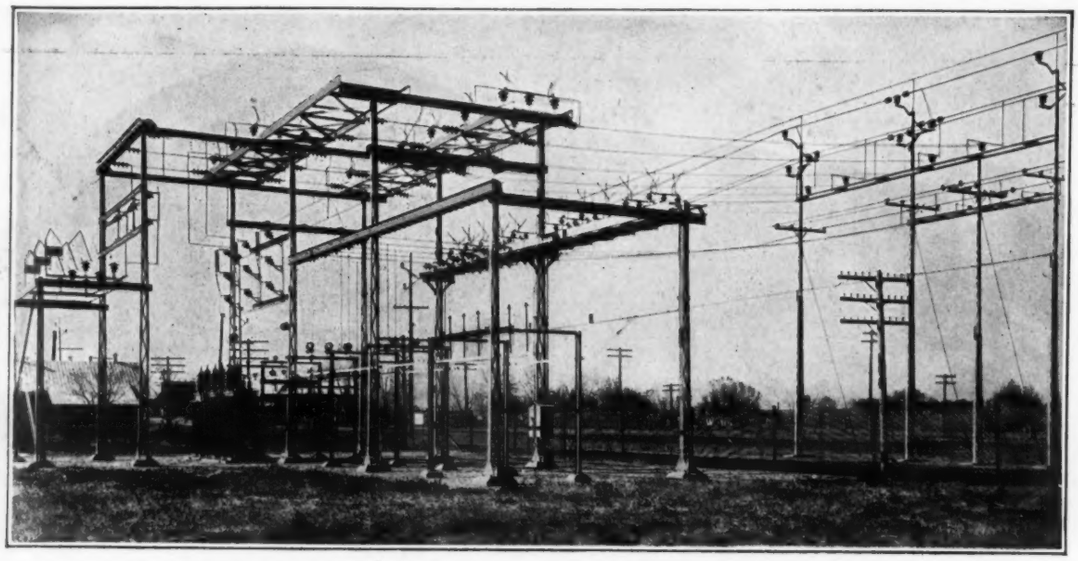


HIGH TENSION EQUIPMENT

DELTA-STAR Dollars Saved Unit-Type Substations



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DELTA-STAR HIGH TENSION EQUIPMENT

UNIT-TYPE INTERCHANGEABLE PARTS

Electrical World

New York, Saturday, October 22, 1921

America's Opportunity in the World's Trade

WHILE the world is slowly righting itself, men in this country are thinking more than ever before about export business. Foreign markets call unceasingly for goods to feed and clothe and stock the world with everything that human beings use. Yet many of our manufacturers have not made any serious effort to tap these boundless resources of rich trade—or, attempting, have through inexperience sent the wrong goods, or the right goods in the wrong way, and met with disappointment.

There is a saying "Blessed is the man who has found his work." Surely this thought should apply to nations no less logically. And what is the true work of America in the world's trade? The answer is not hard to find.

America stands today without peer among the nations for two great capabilities—ingenuity and mass production. The world has come to look to America for electrification of railways, without regard to competition. Our machine tools are unassailably the standard of the world. Our harvesting machinery has won its way to every land. Our small motor cars now run on the roads of every people. In the manufacture of labor-saving machinery of every type we have led in thought and in achievement and we sell abroad to eager markets. And when we export these and other kindred characteristically American products of our ingenuity and our mass production, we sell them profitably and freely—for price is but a secondary factor. The standard and the reputation of these goods—our specialty—has put them on a plane above the reach of competition.

Here, then, is a sensible basis for a broad, national economic policy for the extension of American foreign trade. We need no longer seek, we need not further experiment in exporting. If we would penetrate the markets of the world with American goods, we would do well to concentrate on these specialties which success already has shown to be "our work" and put the many typically American products of our ingenuity into mass production. When these have won our way into new ports and built us trade, then we may more easily extend our influence with broadened lines.

To make this truly a national program will naturally take some time, for men's minds move slowly in such matters. But to make it the export policy of the electrical industry should be simple enough since so many of our electrical commodities are distinctly products of our Yankee ingenuity. Let us put mass production behind these specialties of ours and make American electric labor-saving appliances the standard of the world.

Henry Damon Shute

Who brings to his work of directing the sales of one of the largest electrical manufacturing organizations a background of successful experience in engineering, production, administration and finance.

JUST as much of an obligation to develop the industry in the proper direction rests upon those in charge of sales as upon the electrical engineering talent of the country. It is they who bridge the gap between the inventive genius of the industry and the user. They tell the world what the engineer has made and bring back to the engineer the composite representation of the buying mind. It seems reasonable, therefore, that the sales managers of the country, particularly where heavy equipment is concerned, should have a sympathetic appreciation of the engineering involved and of economic limitations to engineering achievement. Such a sales manager is Henry D. Shute, vice-president in charge of sales of the Westinghouse Electric & Manufacturing Company, an engineer by education and training. Mr. Shute came into the sales branch of the business from the engineering department, but he has never been a salesman in the strict sense. He has, however, had a very wide experience in the Westinghouse company and in the electrical industry. In addition, he is endowed with that characteristic faculty of successful executives—the faculty of appreciating quickly the meaning of facts and making immediate decisions. He also possesses a vivid imagination, which is an asset of considerable importance to the man who plans for the future.

Mr. Shute was born in Somerville, Mass., Aug. 1, 1871. In 1892 he was graduated from the Massachusetts Institute of Technology with the degree of bachelor of science in electrical engineering. A year's post-graduate work followed in the School of Mines at Clausthal, Germany, and the Technical School at Dresden. On his return to the United States in 1893 he entered the Westinghouse shops as a student apprentice. During his eighteen years of service with this organization he has worked himself up, department by department, to his present responsible position. His first transfer was to the transformer department; from there he went to the testing department, and thence to the engineering department laboratory. Later he was delegated to follow up the manufacture of switch gear for the Niagara Falls installation, and when this work was completed he was made assistant foreman of the shop experimental department.

Mr. Shute next became a designer of switchboards in the engineering department. Thus did he round out five years of engineering and production experience which served as a substantial foundation for his later sales and executive career.

In 1908 Mr. Shute was brought into the sales department and his knowledge of the company's products and their performance stood him in such good stead that before long he was made chief of the alternating-current division. In 1906 Vice-President L. A. Osborne selected him as his assistant. In this work Mr. Shute received his schooling in executive and administrative duties and was identified with the developments made in heavy electric traction and particularly in single-phase work. In 1910 he was appointed acting vice-president with routine executive duties. Four years later he became treasurer of the company, continuing as such until 1917, when he took up the work in which he is now engaged. He is thus able to bring to his work a well-rounded experience in production, engineering, finance and administration.

As would naturally be expected, Mr. Shute's sphere of influence extends far beyond the confines of the Westinghouse organization. He has been very active in civic affairs in Pittsburgh and is a director of a great many Pittsburgh institutions.

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The Threat of a Great Railroad Strike

WITH the unemployment conference barely adjourned, the railroad brotherhoods have ordered a general strike on all the railroads of the land. The purpose is to compel two million workers now employed to quit and force out many other millions in affected industries. The issue is clear. In July, 1920, the Federal Railroad Labor Board raised the wages of the railroad men approximately 22 per cent to help them meet the higher costs of living. This they accepted. The total increase since 1915 then approximated 100 per cent. The same board is now ordering the railroads to reduce wages approximately 12 per cent in line with the deflation of general costs and prices. It is met by the unions with a call for a complete tie-up of the industry of the country. It is a strike not against the railroads but against the government.

Two points stand out. The situation must be handled with absolute justice and reason. The railroad men must not be asked to make greater concessions than the balancing of the economic situation demands. But deflation is a wave of readjustment that must affect all, and no single group of men can block its path. The railroad brotherhoods cannot change economic laws. Neither can they be permitted to intimidate the nation and nullify the efforts of the unemployment conference by forcing into idleness further millions now working. If necessary, we may well follow the precedent set stoutly by England's premier and pledge the whole resources of the government to prevent it.

This is a principle to which every red-blooded American will subscribe. The other point is a matter of no less national import and it concerns the electrical industry particularly. A railroad strike to the utilities means, essentially, fuel. Restriction in fuel supply means strangulation, not only to the electrical industry but to all industry, and paralysis of business, which in turn means more unemployment piled up in a rising, spreading pyramid. Be the argument what it may, strike or no strike, coal must come to the utilities for the service and the safeguarding of all the people. This should be made plain to all concerned.

Public Utilities and Municipal Politics

THE chairman of the Public Service Commission of New York is a rather shrewd political observer, and politicians are usually opportunists. When therefore he advocated municipal ownership of the gas properties in New York City in a speech before the Empire State Gas and Electric Association he exhibited a certain state of mind—political perhaps, for he voiced his own opinion and not that of the commission over which he presides. Perchance he was moved by an impelling sense of public duty. Who knows? At any rate, he is out of tune with the great body of public utility commissioners throughout the country, and dissonance to the musical ear can be no more horrid than a want of harmony between commissioners to the users and backers of public utility service. Moreover, the remedy which he suggests, uniform service at uniform rates, needs to insure its adoption no such machinery as municipal ownership would provide. The New York Public Service Commission has jurisdiction over both private and municipal utilities with regard to rates, service and accounts, including rates fixed by grant, statute, franchise or ordinance, and has jurisdiction over private utilities with respect to capitalization. If, therefore, there is anything radically wrong with the gas and electric properties in the Greater City, why does the Public Service Commission remain inactive? Is it not its bounden duty to enforce the law? From all of this it would seem that politics more than anything else is back of Mr. Prendergast's proposal. Nevertheless, his suggestion is not without merit, and the numerous utilities ought to perfect their operating organizations and interconnections so as to make possible greater uniformity of service and, where possible, of rates. With legal obstructions removed and a sympathetic commission much could be accomplished. The commissioner must know that rates are based on investment and not on wishes, and that with single ownership, and that not municipal, all that he seeks can be brought about. It is within the power of the Public Service Commission more than of any other body or of any individuals to determine whether a movement in this direction shall be expedited or impeded.

Another Vacuum Tube Makes Its Advent

ONE of the indirect results of the development of the thermionic tube is the stimulus to further experimental investigation of the possibilities of gaseous and electronic conduction in vacuum tubes. Among recent results of this work is the so-called "magnetron" noticed in these columns a few weeks since. Still another new type of tube has now been announced by V. Bush and C. G. Smith, who gave a description of it at a recent meeting of the Institute of Radio Engineers. Its principal property is that of rectification. In many external respects the new tube is similar to the magnetron. Fundamentally, however, the operation depends on a totally different physical principle.

Gases are ordinarily classed as insulators. They become conductors when the small number of free electrons always present are accelerated sufficiently in their free paths to ionize the molecules with which they collide. At atmospheric pressure the electric intensity required to accelerate the electrons is very high, but when once this value is reached enormous numbers of molecules break down at one time, resulting in a prac-

tical short circuit through the air in the form of the arc, or spark. As the pressure is reduced the paths of the electrons become larger and the molecules become fewer. Thus the electrons acquire higher velocities, gas begins to conduct at lower values of electric intensity and the resulting currents become smaller. Below one centimeter of pressure air begins to conduct somewhat freely, but the volume of discharge is limited by the number of molecules present.

The essential difference between the new rectifying tube and the hot cathode tube is that the former contains gas at low pressure, whereas the gas in the latter is withdrawn as completely as possible. The two electrodes of the tube are so arranged that normally an electron leaving one electrode and reaching the other does not acquire ionizing velocity. When a magnetic field is applied, however, the path of the electron is deflected, causing it to become longer, and owing to the longer path it is enabled to reach an ionizing velocity, thus setting up conductivity. The tube therefore may be changed from a non-conducting to a conducting condition by superposing a magnetic field. The rectifying property is obtained by using coaxial cylindrical electrodes. The deflection due to a given magnetic field of an electron leaving the inner cylinder is different from that of an electron leaving the outer cylinder. Consequently by adjusting the magnetic field so that electrons leaving one cylinder will cause conductivity, while those leaving the other cylinder will not, the tube will have a unidirectional conducting power.

A notable advantage of this new form of tube is that it has cold electrodes and when used as a simple rectifier requires no auxiliary circuit of any kind. Its rather obvious disadvantage is its low current capacity, the maximum figures mentioned so far being of the order of milliamperes. The voltage, however, is relatively high, and doubtless a capacity in rectification of several kilowatts could readily be obtained. However, these figures are all low as compared with the possibilities of the thermionic tube. The volume of electronic discharge from an incandescent cathode is far greater than may be reached in tubes of reasonable dimensions relying on gaseous conduction at low pressure. From its principle it would appear that this tube could be used also as a detector for radio signals. This usage is not mentioned by the authors, although further information as to other interesting properties of the tube is promised.

Accurate Accounting Vital in Deferred-Payment Security Sales

MANY new problems for the central-station company's accounting department have arisen out of the growing practice of selling securities direct to the consumer under the deferred-payment plan. The purpose of the public sale of utility stock is more than the mere raising of capital, important as that is. It seeks to establish a vast number of new contacts with the people of the community in order that a sure bond of mutual interest may be built up between the service corporation and the householder, the merchant and the business man. It is important, therefore, that in the sale of stock the company should come through clean in all its transactions with the public and sacrifice no confidence through errors caused by careless or inadequate accounting. If the new interest between the security purchaser and the utility is to be molded into friendship, it is essential that no annoying mistakes be made in the period when the installments are being paid and the first impressions of the unaccustomed relationship are being recorded on the new stockholder's mind.

To prevent such mistakes it is vital that methods of accounting for deferred-payment security sales be brought to the highest point of efficiency and helpfulness. It is not enough that each company should apply its own ingenuity and work out the answer as best it can. The matter is one in which the best experience is needed for all, because the success of every campaign is more than local in its influence. It is a factor in the spreading movement of customer stock ownership that is of vital interest to the entire industry. A plan such as is presented in this issue by W. Paxton Little is a practical contribution to the common knowledge that has a great value, and it should be considered and applied wherever its suggestions seem to offer further safeguards. The fact that Mr. Little is himself a certified public accountant who has played an active part in the development of the American Institute of Accounts makes for particular interest and confidence in this system of accounting which he has established for the Niagara Falls Power Company.

Some Modern Standards of Illumination

ONE of the recent Illuminating Engineering Society convention papers, that by Messrs. Curtis and Stair on lighting public spaces and offices, is specially notable as showing the effect of the very general adoption of the gas-filled lamp upon available methods and practicable intensities of illumination. At the present time artificial light is one of the cheapest of necessary commodities, so cheap that purely technical efficiency can be pushed into the background and the beauty and usefulness of illumination brought to the front. Efficiency is all very well in its proper place, but there are times when it should not be obtained at the expense of other things which practically are more desirable. We refer here particularly to the lighting of just such places as the paper before us describes. As a striking example, there was chosen for standard paint of walls and ceilings a soft tone of carbon gray and ocher having a reflection coefficient of 48 per cent. In the days of the earlier incandescent lamps such a choice would have been almost unthinkable, but now it proved to be worth the while merely as a factor in the general architectural effect and the pleasantness of the illumination.

Many of the fixtures described are of a compromise type in which the advantage of a brilliant upward reflector is obtained without the violent contrast of a heavy opaque bowl. If properly proportioned, fixtures of this sort are softer in effect without losing heavily in the efficiency of the upward reflection. In one of the installations noted careful tests were made to determine the loss of light from dust and dirt in a designed indirect fixture. It apparently proved to be about 10 per cent a month, so that by cleaning regularly every two months an over-all efficiency of 80 per cent in the equipment was practicable. It is interesting to note that the intensities in this particular office-lighting task were pushed up to above 10 foot-candles, and that this was done without undue expenditure of energy.

Still another example of effective lighting was in a second office building in which again the luminous-bowl type of indirect units was installed, the particular

form selected utilizing about 12 per cent of the light for the luminous bowl and turning the rest upward. Here too the plane of illumination was carried high to an average of from 8 foot-candles to 14 foot-candles at the level of the desks.

Such installations as these carry out the conclusion which recent work on the technique of illumination has abundantly enforced—that on the whole workers have been trying to do their tasks with too little light, not perhaps too little for technical acuity tests, but quite too little for comfortable and easy working hour after hour. Today it is rather usual to find great spaces in which the natural light is comparatively insignificant. In these the necessities for artificial illumination carry with them a call for such lighting as will produce easy working conditions, not for an hour or two in the late afternoon, but during most of the day, and for persons who on the average require some extra light by reason of vision which would hardly be passed as normal by the oculist. Under such circumstances high intensities like those indicated in the paper we are commenting on become necessary, and they can fortunately be obtained without expense in the least forbidding.

Some Possible Plant Economies

IN POWER plants the limit of development along the lines that have prevailed in the past twenty years is nearly reached, if the view expressed by C. F. Hirshfeld, chief of the research department of the Detroit Edison Company, in a paper presented before the American Society of Mechanical Engineers, be correct. He referred specifically to improvements that might bring economies comparable to those that the steam turbine and the stoker have made possible. By utilizing the highest temperature and pressure limits permitted by available materials and introducing all the possible heat-saving devices the author sees the possibility of laying down a plant capable of developing a net kilowatt-hour for between 14,000 and 15,000 thermal units. The economics of the situation, based on fuel prices that may reasonably be expected in the immediate future, are such that he does not expect to see the figure reduced below 16,000 or 17,000 in the near future.

The study is interesting because of the future possibilities it indicates, but even more for the light it throws on our present development. A few large plants are producing a net kilowatt-hour on less than 20,000 thermal units, but the number that are not approximating this figure is a staggering indication of the distance we have fallen short of utilizing effectively the developments we have already made. Only the largest plants can hope to reach the highest efficiency, and very many plants, if not the majority, may not be able to reach the figure of 20,000 thermal units because of the limits established by the volume of production. The majority, however, can approach much nearer this limit than they are now doing. One method of doing this may be through intelligent reconstruction to eliminate intolerable operating conditions or inefficient equipment now eating up its cost in excess fuel. In more cases undoubtedly the less complicated method of getting rid of careless faults of operation will serve. Leaky drains, dirty boilers, improper practices in burning fuel and careless or slipshod maintenance methods are as much responsible for failure to obtain the economies possible with available equipment as any other factor, unless it be plain, downright ignorance, which is little less than criminal.

Industrial Tractors from a Large User's Viewpoint

THE report presented in this issue by John Causland on the practical costs of industrial tractor in moving material should be of interest to all users, prospective or otherwise, since it comes from the hand of a man who has probably as many under his general supervision as any one in this country. The last few years have disclosed the large importance of tractors in handling material about buildings where it is manufactured or stored. The old industrial railway with small skips pushed by men is rapidly passing out of use. The industrial railway itself is tending to disappear and to be replaced by the tractor, which gets around almost anywhere, can haul a capacious group of trailers and saves the labor of many men. We have heard some strong statements on this point already, but Mr. Causland's citation of an instance where one tractor has done the work of forty men is quite the most striking that has yet come under our notice.

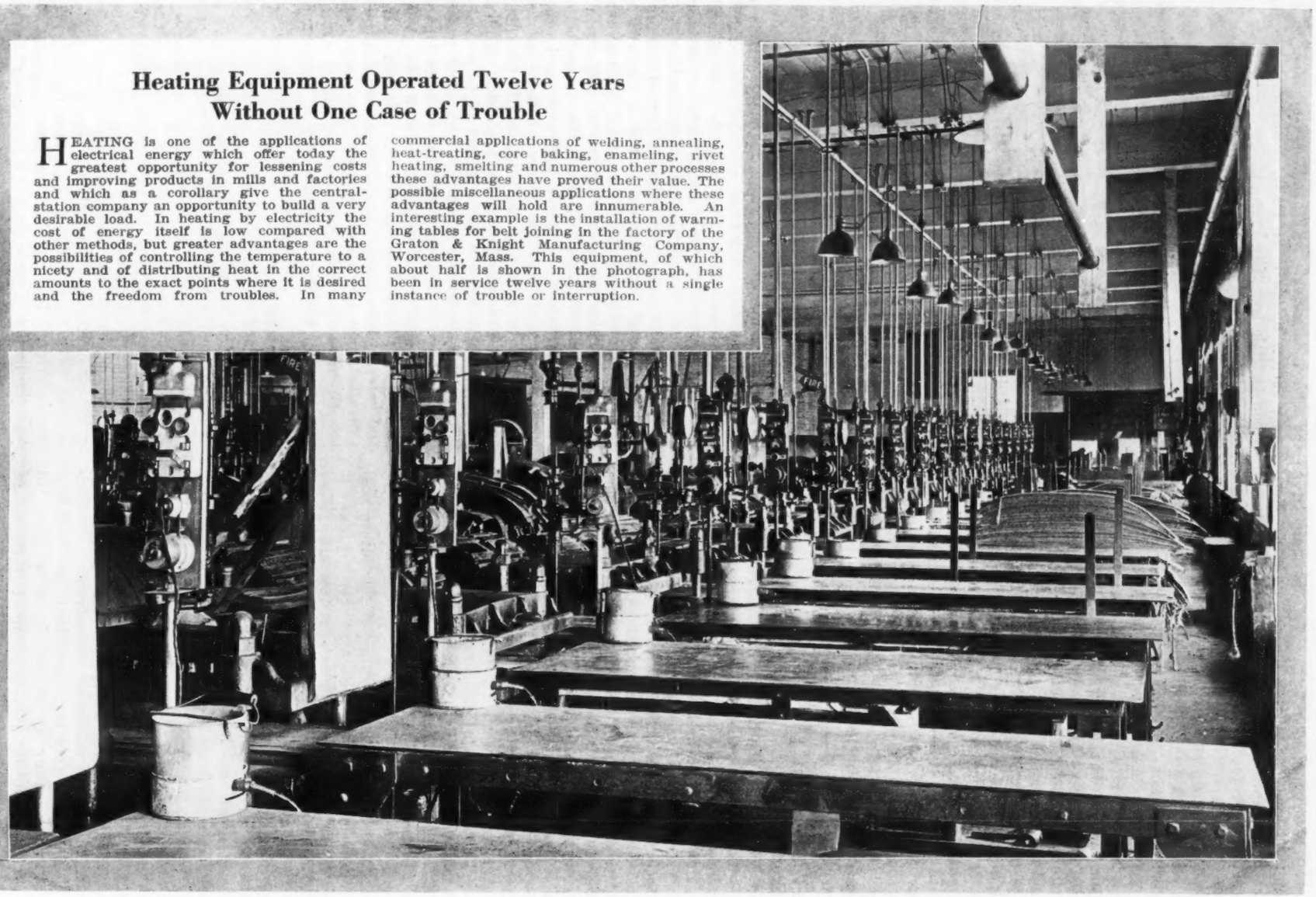
Men, of course, are required for loading and unloading, but for all that the saving of labor comes to a very large sum, in one instance rising to more than 85 per cent and frequently being from one-third to one-half the cost. Experience shows that there is a considerable difference between tractors, and it pays to purchase a substantial and thoroughly well-made machine. The main point is to get a tractor that is rugged and pretty nearly foolproof. It must be handled at times by unskilled men, and its electrical parts must be so arranged that the machine can be readily run without much or any technical knowledge. Of course, the storage battery is the vital part of the whole equipment, and experience is showing that the storage battery as made today, while by no means perfect, has still been developed into a very reliable piece of apparatus. Both the lead and the nickel-iron batteries are in wide use and have proved thoroughly successful. In either type the essential point is to keep close track of operations and see that the battery is properly treated and gets its rations regularly. The depreciation of both tractors and battery from rough usage often amounts to a considerable figure, but nevertheless the net result of their use is the saving of a large sum compared with the investment or with the competitive cost of hand haulage.

A Little Matter of a Word

YEARS ago, before central-station-company men had begun to think commercially, the habit was developed of speaking of the customer as a "consumer." The word has stuck in the electrical man's vocabulary, and yet it was not a good word for general adoption. It is too impersonal. People are people, not things, and the use of a term that classifies them as mere puppets is always offensive. The trainman who treats his passengers as if they were no more than "fares" incurs unpopularity. The lighting company employee who calls the man who pays the bill a "consumer" is doing the same bad thing. Purchasers of transportation and purchasers of electricity are valued customers of a utility, both of them, and, being human, both are pleased when they receive a little public recognition of the fact.

Heating Equipment Operated Twelve Years Without One Case of Trouble

HEATING is one of the applications of electrical energy which offer today the greatest opportunity for lessening costs and improving products in mills and factories and which as a corollary give the central-station company an opportunity to build a very desirable load. In heating by electricity the cost of energy itself is low compared with other methods, but greater advantages are the possibilities of controlling the temperature to a nicety and of distributing heat in the correct amounts to the exact points where it is desired and the freedom from troubles. In many commercial applications of welding, annealing, heat-treating, core baking, enameling, rivet heating, smelting and numerous other processes these advantages have proved their value. The possible miscellaneous applications where these advantages will hold are innumerable. An interesting example is the installation of warming tables for belt joining in the factory of the Graton & Knight Manufacturing Company, Worcester, Mass. This equipment, of which about half is shown in the photograph, has been in service twelve years without a single instance of trouble or interruption.



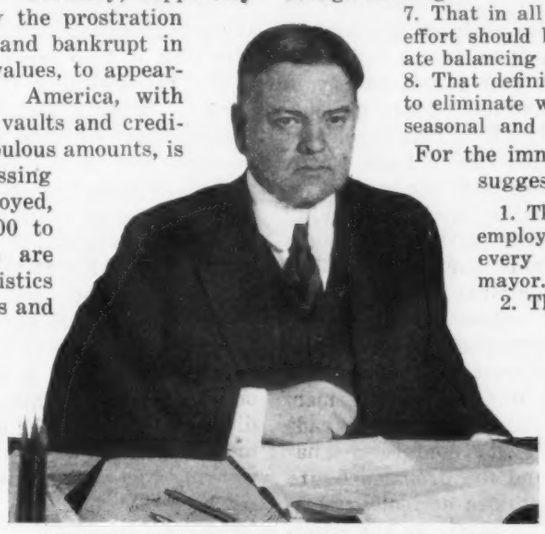
The Practical Achievements of the Unemployment Conference

A Crystallized Review of Its Recommendations and the Two Great Economic Background Problems Which the Conference Has Unveiled—The Need for Labor Statistics and Labor Load Dispatching

By EARL E. WHITEHORNE

NOW that the unemployment conference has done its work in Washington and gone its way and a week has passed in which to think about it, the question of results and responsibility comes uppermost. What did the conference accomplish? What is to be done about it next?

The world today is distraught by economic phenomena of the most unusual kind. Germany, supposedly bled weak from war, ruined by the prostration of its industry and commerce and bankrupt in face of its vanishing currency values, to appearances is busy and prospering. America, with one-half the world's gold in its vaults and creditor to almost every nation by fabulous amounts, is beset by hard times and the pressing need for relieving its unemployed, variously totaled from 3,500,000 to 5,750,000. And these figures are not to be thought of as statistics only, for they represent the lives and sufferings of men, women and children.



SECRETARY HOOVER, THE GUIDE AND INSPIRATION OF THE CONFERENCE

Therefore President Harding summoned to Washington a body of the men and women best qualified by position and experience to devise and recommend the way to prompt and permanent solution of this problem of non-employment and the perpetual menace which it brings. In other words, the people of the United States, through their executive, called this conference under the leadership of Secretary of Commerce Herbert Hoover to decide what should be done and to direct what agencies should initiate and carry on the measures for readjustment. This action carries with it the nation's acknowledgment of willingness to accept the decisions and follow the direction of the conference, to be satisfied for the emergency with its judgment, and without further argument or conversation to proceed to the application of the remedies recommended.

The various committees of the conference suggested many possible directions in which immediate relief can be sought and provided. They pointed out the larger economic principles and policies which when adopted and applied will permanently establish and maintain a better balance in the labor market. These reports have been published in detail in the daily press, but in brief they recommend for permanent relief the following measures of economic readjustment:

1. That railway rates be rescheduled to a fairer balance with the relative values of commodities.
2. That the working out of the present problem of taxation be speedily completed in a bill that will reduce the tax burden.
3. That tariff legislation be promptly and definitely settled.
4. That the financial relationship between the railways and the government be speedily adjusted.
5. That world armaments be limited.
6. That steps be taken to minimize the fluctuations in foreign exchange.
7. That in all fields of industry and occupation effort should be made to speed the proportionate balancing of the inequalities in depletion.
8. That definite programs of action be formed to eliminate waste and regulate employment in seasonal and intermittent industries.

For the immediate emergency relief it was suggested by the conference:

1. That emergency committees and employment agencies be established in every city under the direction of the mayor.
2. That statistics on the number and condition of the local unemployed be published daily in each city to impress upon the people their responsibility.
3. That private homes, hotels, offices, etc., do all contemplated repairs and improvements at once.
4. That municipalities expand their school, street, sewage, repair and public buildings work to fullest volume under existing circumstances, since the sale this year of the largest amount of municipal bonds in history shows that much is possible along this line.
5. That federal authorities should expedite construction of public buildings and public works covered by existing appropriations.
6. That congressional and state appropriations for roads be made immediately available.
7. That the present need for construction, estimated at more than a million homes, with a shortage in all buildings totaling from ten to twenty billion dollars, be met by co-operative action of federal, state and municipal governments to determine facts, discover causes and organize community action to secure readjustments.
8. That manufacturers endeavor to employ more men by part-time work, rotation of jobs, production for stock, plant construction and repairs, shorter working days and shorter working weeks.
9. That public utilities of all classes be urged to advance their programs for construction and repair.
10. That mines be urged to increase output and establish a larger stock reserve and that railways be asked to accumulate larger reserves of coal along their lines.
11. That appropriations be made to increase employment on reclamation projects now under way or proposed.
12. That American shipowners give preference to American seamen, that usual periodic overhauling of ships be done at once, that Shipping Board vessels to be broken up

be dismantled now, and that idle shipyards engage in other lines of industry.

13. That an appeal be made to all business men temporarily to reduce profits as far as compatible with safe business practice to lower prices and encourage buying.

14. That a broad appeal be made to the public to buy now and stock up with general commodities and equipment in order to increase the demand for labor in the factories, in the warehouses and stores and on the common carriers.

Such are the definite results of the conference itself, and if the people of America stand to their responsibility the emergency will be relieved.

But beyond all that, the conference has focused the attention of the country on a great fundamental problem. It has set men to thinking more broadly about labor as a national resource and a universal responsibility. And in the course of this thinking certain facts have begun to stand out clearly in the light of reason that before have been both buried and ignored.

LABOR STATISTICS NEEDED

The first consideration which the conference has uncovered is the fact that in this country there are no reliable statistics on the condition or location of labor. We may know the cotton crop from month to month within ten thousand bales. We may report our grain and live-stock crops, our metal and our mineral production with embracing accuracy. But our labor—an element in every crop that we produce, a basic factor in every industry, whose welfare and employment is a matter vital to our economic health—we know nothing of in the broad sense. We know neither how much labor is at work nor what it is doing, nor how much idle labor is available, where it is nor what it best can do.

Therefore, when the present emergency arose and the country asked how many unemployed there were, the present sources of too limited information made a wild guess and announced the figure as 5,750,000 idle men. The country was shocked and many classes of trade were badly affected. The President's conference analyzed the situation and soon found the probable figure to be 3,750,000, of whom 1,500,000 are normally unemployed, leaving something over 2,000,000 as the emergency unemployed. Secretary Hoover has announced that only from 10 to 20 per cent of the really idle, numbering 375,000 to 750,000, are found to be actually in danger of suffering. The point in mind is that the nation has been thinking, planning and too often, unfortunately, struggling with labor in the dark. Neither labor nor capital, the worker or the employer, has ever known how much labor there was or how it was distributed. No wonder that it has been inefficiently utilized and that no common opinion has ever been reached as to its value and its price.

The second consideration pictured on the background of the conference is no less shocking. It is the fact that in this country—and all others—we have left our greatest natural resource, which is labor, absolutely unorganized, unregulated and abandoned to the unguided currents of the wabbling tides of agricultural and industrial demand. We say that labor is already organized and regulated, but its present organization is social or anti-social in its influences—class against class. It is not organized in any broad economic plan that co-ordinates the powers and the needs of labor with the needs and powers of industry.

Look it in the face and we know that labor in the mass is the greatest of all national resources. It cannot be left to wander over the earth, seeking the demands of industry in chance ways, without the grossest waste. It is more valuable by many times than water in the streams and timber in the forest, but we conserve the water and the wood and cast out our man power a prey to seasonal demands and intermittent markets without the slightest effort made to harmonize harvest season, construction operations, factory fluctuations and other labor market trends.

The trouble has been that no one accepts responsibility for labor. Call it industrial man power and responsibility falls naturally in two directions. The government is responsible for man power, as it is for other natural resources. Industry should be responsible—each industry—in just the same degree to which it is permitted to absorb its portion of this resource. And when we recognize and apply and operate under that responsibility as a nation, we will have begun permanently to solve the economic problem of labor.

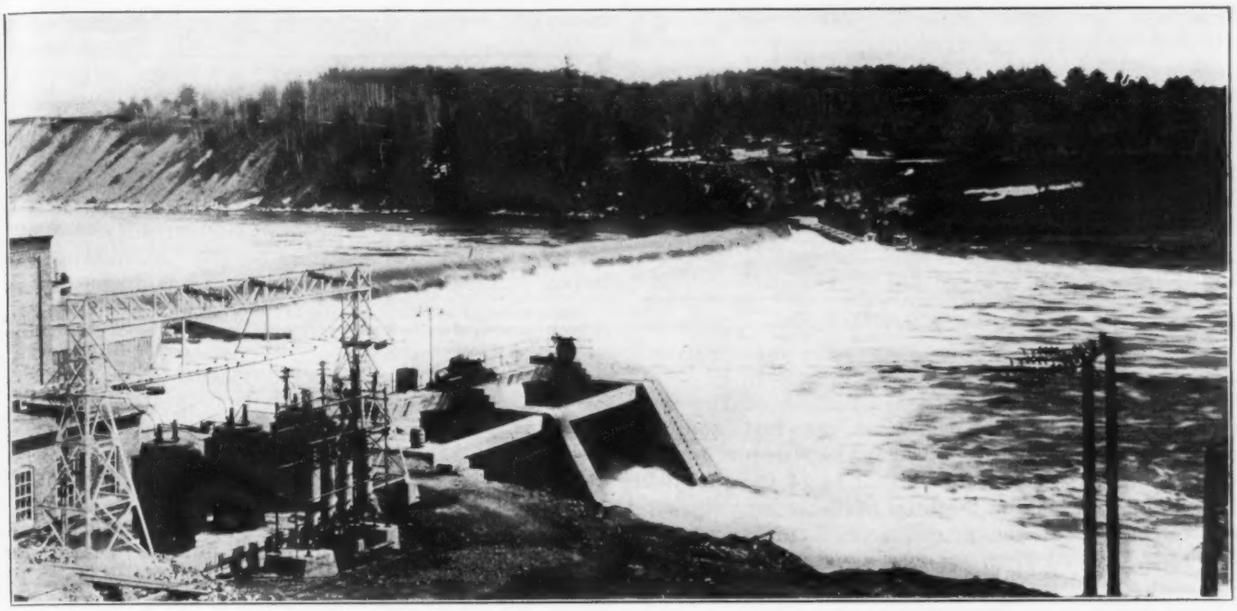
The responsibility of the government, as the unemployment conference quickly decided, must be expressed through the mayor of every city. For idle men congregate only in cities. The mayor must be responsible for reporting a waste of the labor resource and aid in directing it to other markets.

The responsibility of industry can be expressed as simply. When a factory employs a number of men it automatically absorbs a certain measure of the labor resource and should become responsible for it to the nation. If a factory is prepared to utilize and maintain a labor force of 1,000 men, it is entitled to absorb our man-power resource to that extent. But it is not economically right that this factory should intermittently absorb 2,000 men and cast 1,000 of them out again when the rush work is done. That universal practice on the part of industry plus the demoralizing effect of seasonal occupation is to a large degree responsible for our present predicament. It has resulted in such conditions as exist in the extreme in the coal fields, where men receive a wage of $12 a day or more but are working this year about 161 days.

THE WAY CAN BE FOUND

The way can and will eventually be found to solve this problem in an economic manner that will protect our national resource of industrial man power and maintain the price of labor on the basis of its worth. Seasonal occupations we will always have, for the crops must be harvested as they mature. But intermittent non-seasonal occupations such as construction, reclamation, public works and general repair and maintenance can be so regulated that they will not pile up upon the peak of harvest time, but be distributed across the valley of the labor curve. Each factory can be made responsible for the even maintenance of the fragment of the labor resource which it absorbs. A national law compelling the payment of a maintenance wage for a fixed re-employment period when labor is laid off, except for cause, might regulate this automatically. But time and the evolution of constructive thought with practical experiment will tell.

The problem rests today on the American business man and on the government which he elects. We need labor statistics. We need a national labor load dispatcher. The fact that men and women, employer and employee, throughout the land have seen these things and have begun to think these thoughts will perhaps prove to be the greatest practical achievement of the unemployment conference.



Remodeling Plant to Increase Rating

Crib Dam Replaced by Concrete, Old Waterwheels Supplanted by Modern Units, Antiquated Drive Eliminated and Penstocks Renovated—Quadrupled Rating Permits Low Energy Rate with Fair Return on Investment

By PHIFER SMITH
Chief Engineer Bangor (Me.) Railway & Electric Company

OPERATING companies which are handicapped by inadequate plants built a long time ago could probably in numerous cases benefit as much by rehabilitating them as the Bangor (Me.) Railway & Electric Company has done by remodeling its Veazie plant in the manner described in this article. Although all conditions are never the same in any two plants, it is quite possible that the method by which the Veazie plant was brought up to the required standard may suggest ways in which other companies can accomplish a similar object.

The Veazie plant, which was one of the early hydro-electric stations of this country, is on the Penobscot River about 3 miles (4.8 km.) above Bangor. The original installation consisted of fifteen vertical water-wheels, using crown gears and rope or belt drive for driving a horizontal shaft, from which an output of about 1,500 kw. was obtained under the most favorable water conditions through the direct connection of four horizontal generators and the belt-driving of two railway generators. The original dam was of timber crib construction, the head upon the wheels being about 14.5 ft. (4.3 m.) average. Wooden penstocks conveyed the water from a short forebay on one side of the plant to the wheels. Four 6,600-volt, three-phase generators composed the directly-connected units.

The first step in reconstructing the plant was taken in 1912 when the old timber dam was replaced by a reinforced-concrete rollway 570 ft. (17 m.) long. A maximum head of 16 ft. (4.8 m.) was produced, but the average head at the time of the dam reconstruction varied between this and 10 ft. (3 m.) on account of differences in the rock elevation at the outlets of the tailraces of the individual penstocks and of variations in the river stages. The spillway crest of the new dam was equipped with flashboards 3.5 ft. (1 m.) high which can be raised by means of a motor-operated cableway when several feet of water is spilling over the dam. At the downstream end of the forebay is an auxiliary spillway containing two Tainter gates.

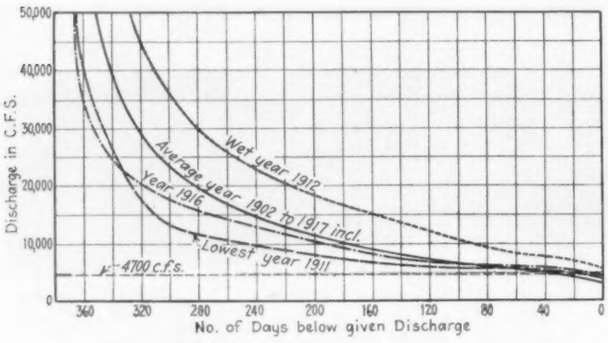
FIRST MODIFICATIONS

Soon after the construction of the new dam a 675-kva. vertical direct-connected waterwheel and generator was installed in the fifteenth flume, replacing the old geared wheel. In 1918 a 600-kva. similar unit was placed in the first flume, and three more vertical wheels were installed in 1919 in place of the old ones. These new wheels were rated at 445 hp. each at 16-ft. (4.8-m.) head.

On account of the slow delivery of vertical generators during the war these waterwheels were connected by crown gears to two of the old line-shaft generators. In 1920 construction work was begun on the remaining ten flumes, the work covering the installation of vertical direct-connected generators and waterwheels. The revised generator and wheel layout is therefore:

Penstock No.	Wheel Diameter, In.	R.P.M.	Cu.Ft. per Sec. at 14.5 Ft.-Head	Unit Rating Kva.
1	48	120	450	600
5–14, inc.	40.5	150	280	400
2–4, inc.	40.5	150	280	(Two gen. tot. 670 kw.)*
15	60	90	610	675

* Two generators, totaling 670 kw.



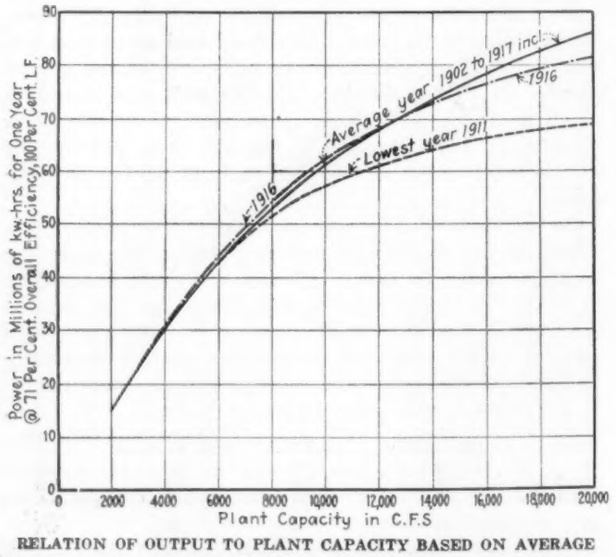
DURATION CURVE OF PENOBSCOT RIVER AT VEAZIE DAM

On account of the crowded condition of the penstocks, however, the capacity of the first and fifteenth units will total only 950 kw. under 14.5-ft. (4.3-m.) head, and that of units 2 to 14 inclusive will total 3,250 kw., making the total available capacity with the completion of the fifteen vertical units equal to 4,200 kw.

About the same time an extended study of the undeveloped power possibilities at the Veazie dam was made for the Bangor company by the Fargo Engineering Company, Jackson, Mich. In studying the Penobscot River, which has a drainage area above the Veazie dam of 7,700 sq.miles (19,700 sq.km.), it was decided that the flowage of 1916 was representative of an average year. On rare occasions the minimum flow at Veazie has dropped to 2,500 cu.ft. or 3,000 cu.ft. (70 cu.m. or 84 cu.m.) per second, and in 1905 to as low as 2,130 cu.ft. (60 cu.m.) per second. At the present stage of development, however, the capacity of the river so much exceeds the capacity of the plant that the extreme minima are relatively unimportant.

ESTIMATED COST OF PROPOSED ADDITION TO THE VEAZIE POWER PLANT TO UTILIZE 2,000 CU.FT. PER SECOND

Construction plant and supplies	$12,000
Cofferdam and pumping	7,000
Rock excavation, 2,620 cu.yd., at $5	13,100
Concrete, including form work, reinforcing and stripping, 1,500 cu.yd. at $28	42,000
Power house, 144,000 cu.ft., at 26 cents	37,440
Intake steel, 1,140 sq.ft., at 50 cents per square foot and 9 cents per pound	5,130
Hand crane, 10 tons	2,500
Turbines, four units, vertical, single-runner type, complete with governor installed	66,000
Generators, four 650-kva. vertical, direct-connected, complete with exciters	74,000
Switchboard installed	3,000
Oil switch	2,300
Transformers, three 600-kva. (25 per cent overload), oil-cooled, outdoor type, including structural unit and foundation, installed	14,300
Lightning arresters, installed	2,500
Station wiring and miscellaneous electrical	11,000
Engineering superintendence, resident engineer, miscellaneous expenses	19,000
Contingencies	14,730
Total	$326,000



RELATION OF OUTPUT TO PLANT CAPACITY BASED ON AVERAGE MAXIMUM AND MINIMUM FLOW

ANALYSIS OF ESTIMATED RETURN ON INVESTMENT (VEAZIE HYDRO-ELECTRIC PLANT)

I. Cost of installation:	
Renovation of thirteen penstocks and four additional units	$693,000
II. Annual charges:	
1. Maintenance (operation, maintenance of dam, labor cleaning racks, etc.)	$11,000
2. Depreciation:	
Foundations, buildings, and appurtenances. Take fifty years' annual amortization, including 6 per cent interest	1,030
Machinery. Take twenty-five years' annual amortization, including 6 per cent interest	5,740
3. Taxes and insurance, 2 per cent	12,480
4. Interest on bonds, taken at 8 per cent	55,440
5. Amortization (ninety-year bonds)	2,150
Total	$87,840

Selling prices at which various rates of interest* will be earned on the capital invested in excess of the fixed charges, including interest on bonds, are as follows:

Rate of Interest on Capital	Selling Price per Kw.-Hr. (Cents)
0	0.325
10	0.582
15	0.711
20	0.839

* Based on relation $S = (Kr + E) \div O$, where r = rate of interest, K = capital invested, E = annual expenses, O = annual output and S = selling price per kilowatt-hour.

The power output for 1916 was computed in detail for plant capacities of 2,000 cu.ft. to 10,000 cu.ft. (56 cu.m. to 280 cu.m.) per second in steps of 2,000 cu.ft., taking into account the varying head and varying wheel capacity. As a conservative over-all efficiency at the high-tension side 71 per cent was assumed and the average twenty-four-hour power was computed for ten-day periods. These computations furnished the curves shown for plant capacities of 2,000 cu.ft. to 10,000 cu.ft. per second and 100 per cent load factor, and the plotted integration of these curves gave the average annual kilowatt-hour output at 100 per cent load factor for various plant capacities for the typical year 1916. These figures were computed in detail and served as a basis for comparison with the average from 1902 to 1917 inclusive.

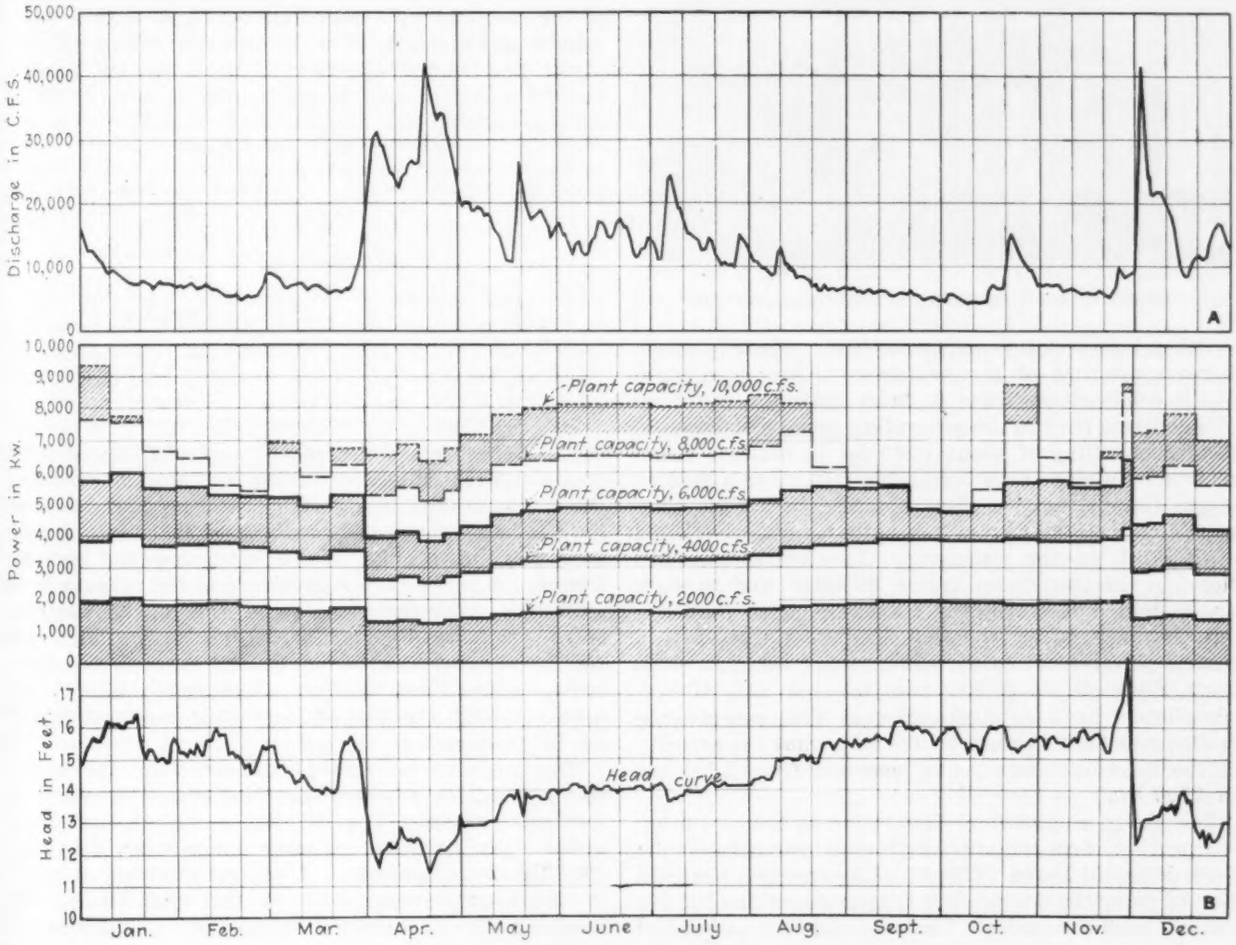
From the duration curve of an average year, 1902 to 1917, the power output was computed by taking the output proportionate to the duration, which was nearly equal to that of 1916 for various plant capacities, and this curve was also plotted. Below a discharge of 10,000 cu.ft. per second this curve differs very little from the curve for 1916.

With the fifteen existing penstocks carrying 4,700 cu.ft. (131 cu.m.) per second, the output at 100 per cent load factor could be 35,000,000 kw.-hr. a year, and at 80 per cent load factor it could be 28,000,000 kw.-hr. The utilizable power at the Veazie dam taken at 100 per cent load factor and 71 per cent average over-all efficiency is given in the following table, taken from the Fargo investigation:

	Plant Capacity	Output at 100 per Cent Load Factor, Kw.-Hr.
Average year	10,000 c.f.s. (9,200 kw.)	60,950,000
	20,000 c.f.s. (18,300 kw.)	86,210,000
	6,700 c.f.s. (6,000 kw.)	46,500,000
Dry year	10,000 c.f.s	57,400,000
	20,000 c.f.s.	69,068,000

Although the limit of firm power is reached at a lower plant capacity than that given in the preceding table, 6,700 cu.ft. (187 cu.m.) per second being 7.41 per cent above the limit, it was decided that the plant could be economically developed to utilize this flow, since the forebay has a cross-sectional area at its entrance of 1,835 sq.ft. (169 sq.m.) and could easily allow an average velocity of 3.65 ft. (1 m.) per second. The flow of 6,700 cu.ft. (187 cu.m.) per second is 2,000 cu.ft. (56 cu.m.) per second more than the fifteen penstocks could carry satisfactorily, but this additional amount could be discharged through the Tainter gates, to which reference was made previously, and four generating units with a capacity of 500 cu.ft. (14 cu.m.) per second each installed below them. Such an arrangement would permit utilizing the forebay without excessive velocities of approach.

The river capacity is much larger than the plant capacity. From the curves shown it appears that the available energy output is 86,210,000 kw.-hr. for a plant capacity of 20,000 cu.ft. (560 cu.m.) per second, but this requires a large amount of stand-by power. Although 15,000 cu.ft. (420 cu.m.) per second plant capacity would be 8,300 cu.ft. (232 cu.m.) per second larger than the proposed utilizable capacity of the present forebay, such an addition would present considerable difficulty of proper arrangement. The maximum floods, estimated at 125,000 cu.ft. (3,500 cu.m.) per second, have to be considered and the spillway capacity preserved. The provision of a new tailrace for the present fifteen penstocks on the land end would be essential and the forebay would have to be increased in depth, with other changes or new construction.



PLANT CAPACITY THAT WOULD BE AVAILABLE AT DIFFERENT TIMES OF YEAR BASED ON 1916 HYDROGRAPH AND HEAD CURVE OF PENOBSCOT RIVER AT VEAZIE DAM

NEW UNITS WILL HAVE CAPACITY OF 1,800 KW.

The four new units would have a capacity of 1,800 kw., and the total plant capacity would be raised to 6,000 kw., giving an average annual power output at 100 per cent load factor and 71 per cent efficiency on the high-tension side of 46,500,000 kw.-hr. The load factor on the Bangor Railway & Electric Company's system is over 80 per cent, so that it may be assumed the Fargo investigation shows 37,200,000 kw.-hr. of this output to be salable power.

The renovation of the fifteen penstocks and the addition of 2,000 cu.ft. (56 cu.m.) per second plant capacity at the downstream end of the forebay, bringing the total plant capacity to 6,700 cu.ft. (187 cu.m.) per second, will yield an average annual increase in output of 27,000,000 kw.-hr. The estimated cost of the remaining penstocks renovation in 1920 was $298,000, and that of the addition of 2,000 cu.ft. per second was $326,000. The expected returns on this investment are given in the accompanying table.

From the foregoing the Fargo company reached the conclusion that if the load factor of 80 per cent can

be maintained, a selling price of 7 mills figured at the high-tension terminals of the generating station would yield an attractive return on the capital invested over and above 8 per cent interest on bonds and all other fixed charges, including amortization of bonds. The increase of plant capacity to 6,700 cu.ft. per second was therefore determined to be a proper investment.

GENERATOR ROOM OF PLANT AFTER REHABILITATION

Other improvements at Veazie lately effected include a rearrangement of the switchboard, the installation of all 6,600-volt switches in brick cells, the provision of a concrete floor in the generating room, and the complete dismantling of about 1,200 hp. in obsolete steam reserve. No plans have been made relative to a modern steam reserve, as this plant is tied in with the company's stations at Ellsworth, on the Union River, and at Milford, on the Penobscot. The hydraulic conditions on the two rivers are so different that a spare waterwheel unit at Ellsworth answers much the same purpose as a steam reserve. The Veazie plant is a central power-distributing point, energy being received from Ellsworth at 50,000 volts through a 5,000-kva. transformer bank installed outdoors. This outdoor substation was built in early 1920, at the time the capacity of the Ellsworth station was increased from 2,200 kw. to 4,700 kw.

The Fargo Engineering Company was the consulting engineering firm on the hydraulic portion of the work described above. The actual construction has been carried on by the engineering department of the Bangor and affiliated companies. This department also handled the electrical design and construction work for the Veazie and Ellsworth improvements.

Shock-Resisting Test of Air-Gap Type Bushing

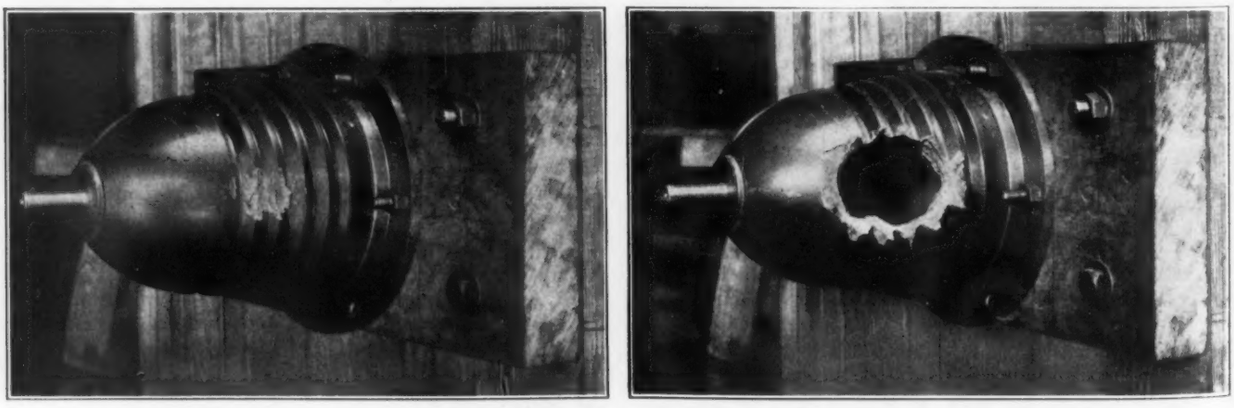
A SERIES of impact investigations have been carried out on a bushing developed recently for use in the naval service for radio-telegraphic purposes, as shown in the accompanying photograph. This insulator is a radical departure from other insulators of the bushing type in that the stresses between the central conducting rod and grounded securing flange are through a dielectric of air. The wall is approximately 1 in. in thickness. The impact was delivered to the insulator by a pendulum arranged with a 43-lb. sphere approximately 8 in. in diameter suspended in a direct line with the center of the insulator from a roller bearing secured to the ceiling of a room 12 ft.

IMPACT TESTS ON BUSHING

Impact Blow Number	Results of Each Blow Upon Bushing
1 to 6	Chipped corrugations
7	Surface crack
8	Hole 1 5 in.
9	Hole 2 in. x 3 in.
10	Hole 2.5 in. x 4 in.
11	Hole 2 5 in. x 4 in.
12	Hole 2.5 in. x 4 in.
13	Hole 3 in. x 4.5 in.
14	Hole 3 in. x 4.5 in.
15	Hole 3.5 in. x 4.75 in.
16	Hole 3.5 in. x 4.75 in.
17	Fracture

high. Impact was delivered at a centrally located point on the flat ribbed portion of the insulator by releasing the sphere from a height of 9½ ft. The photograph at the left below shows the condition of the insulator surface after the first blow of 410 foot-pounds had been delivered. A surface crack developed at the seventh blow extending from the top side of the middle securing bolt to the mashed portion of the insulator. This crack was very slight and did not extend through the insulation to the inner surface. The eighth blow broke a hole through the wall of the insulator approximately 1.5 in. in diameter.

The insulator top was carried away by the seventeenth blow, the fracture occurring along the plane of maximum stress. The insulating material was not pulled away from the securing flange when the insulator failed mechanically. A general summary is given in the accompanying table of the condition of the insulator after each impact blow. The foregoing information was furnished by George Lewis, engineer of the Electrose Manufacturing Company, Brooklyn, N. Y.



PROGRESSIVE CONDITION OF BUSHING AFTER BEING SUBJECTED TO IMPACT BLOWS OF 410 FT.-LB.
Left—After first blow, corrugations chipped. Right—Condition after the fifteenth blow. Bushing was fractured by seventeenth.

Tractors Lower Freight-Handling Costs

Comparison with Hand-Labor Costs—Elements Entering Into Costs and Methods of Securing Basic Data—Points to Be Considered in the Selection of Tractors

By JOHN CAUSLAND

INDUSTRIAL tractors offer the most effective method for moving material in warehouses, railway terminals and shops, industrial plants and all similar places. A tractor will easily do the work of from five to twenty men, and in some instances it has been known to do the work of as many as forty men. Tractors can be operated to the best advantage where it is possible to make up long trains of trailers and then will readily handle many times heavier loads than the normal 20-ton capacity.

COST OF OPERATION

Based on the experience of the writer, the cost of operation of a tractor is figured, on an average, at about $4 a day, including depreciation on tractor, battery and tires, interest on the investment, maintenance, charging, etc. A four-wheel tractor, which has a 48-volt battery, will run approximately 15 miles (24 km.) on a charge, hauling a 10-ton load in one direction and returning with empty trailers. On this basis the cost per ton-mile for operating the tractor is 5 cents. Since the loaders or pilers frequently take care of coupling and uncoupling the trailers, only one man per tractor is required. If he is paid $4 a day, the total cost of moving material is 10 cents per ton-mile (omitting the cost of loading and unloading).

The three-wheel tractor is a lighter-weight machine with a battery of smaller capacity. Since it does not handle as much load per trip, the cost per ton-mile is necessarily higher than for the four-wheel tractor.

For the sake of comparison with manual handling of material we can take an operation where a car is being loaded with soap in boxes weighing 100 lb. (45 kg.) each, the distance from the warehouse to the car being 300 ft. (91 m.). A carload of such material amounts to approximately 30,000 lb. (13,600 kg.).

Two men in the warehouse can pile this soap on trailers in one and a half hours, and two more men at the car can pile the boxes ready for shipment in the same length of time. The tractor can readily keep the trailers moving between the warehouse and the car and still have time for other work, but for the sake of simplicity its entire time and the time of its operator for one and one-half hours is charged to this operation. Six hours' labor for the two piling gangs at 35 cents an hour makes a total of $2.10. One and one-half hours of the truck operator's time at 40 cents an hour is 60 cents more, and 30 cents for the tractor's time makes the total cost of loading the car by the tractor-trailer method $3, or 20 cents per ton.

Using man power throughout, the same two piling gangs will be required and in addition a trucking gang of approximately five men. This is estimated on a basis of three minutes per round trip with each man handling two boxes of soap per trip. Six hours' labor for the piling gang and seven and one-half hours' labor for the trucking gang result, a total of thirteen and one-half man-hours, which at 35 cents an hour amounts to a total labor charge of $4.73, or 31½ cents per ton. Thus the saving by the use of electrical equipment is 11.5 cents per ton, or 36.5 per cent. Actual installations show savings much larger than this. In fact, one user in Kansas City reports an advantage of over 85 per cent in favor of the industrial truck.

At one freight station in Chicago a four-wheel tractor is employed for the icing of cars. With this equipment nine men out of a crew of eleven have been eliminated. As the tractor without the operator costs about as much to operate as the wages paid one man, the cost of icing has been reduced to one-fourth what it was under hand-labor conditions.

In these figures the depreciation and maintenance of the trailers and of the hand trucks have been neglected, since these two figures closely balance each other and would not affect the final results.

COST RECORDS

Records of the cost of moving material are important since they furnish a barometer of the effectiveness of the handling system. The simplest method for figuring this cost is to maintain records of all handling expenses and of the tonnage moved. The cost per ton for any given period is then very easily calculated. In some cases the costs are figured on a basis of ton-miles, but this is only practicable where the tractors run repeatedly over the same courses.

In figuring costs it is important that maintenance and repair charges or any unusual expenses be distributed over a long period of time so that the cost for any short period of time will be a true indication of the actual expenses of handling material and not be affected by some unusual amount of maintenance work which was done during that period. Cost figures should include the following items:

I. Depreciation on (a) tractor, (b) battery, (c) tires, (d) charging equipment, (e) trailers.

II. Interest on the investment.

III. Maintenance of (a) tractor and battery, (b) charging equipment, (c) trailers.

IV. Cost of charging current.

V. Pay-roll expense for (a) charging attendant, (b) tractor operator, (c) loading gang.

VI. Salary of foreman.

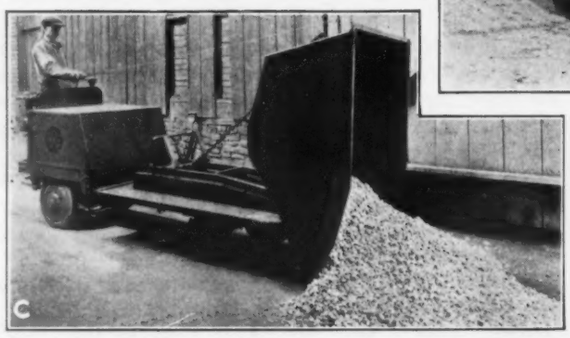
In order to keep records of the tonnage handled, unless weights are known, floor scales of the dial-reading type should be provided and placed where the trains would cross them in making regular trips. Each trailer should be plainly stenciled with its tare weight in order to assist in ascertaining the net weight of the load. These records could be kept by the scale man, who in some installations could also check the shipments into the car.

The first consideration in purchasing a tractor is ruggedness. No matter how much care is used in

Tractors Adaptable to Diversified Conditions

A

B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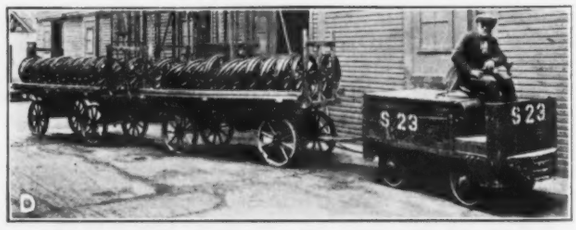

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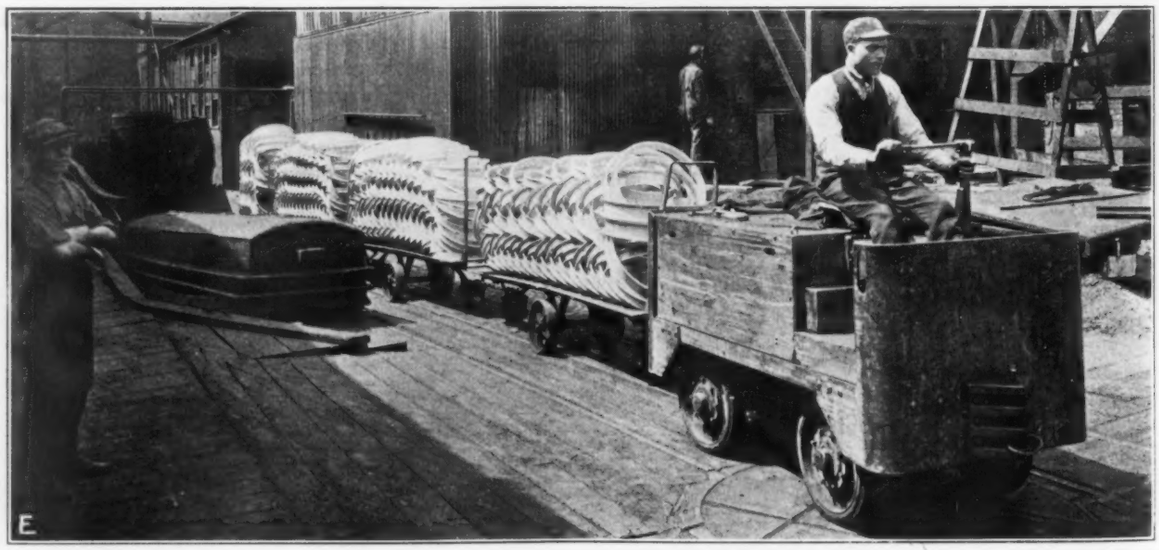

E

A—Hauling sixty bales of cotton at a large seaboard compress. Trailers of the four-wheel steer type are employed, as shown.

B—A special type of hopper trailer handling refuse being drawn over rough roads and grades.

C—Industrial trucks are frequently equipped with dump bodies or other auxiliary equipment.

D—Large "express type" trailers hauling wheels and other miscellaneous large parts.

E—Hauling load of rims on balanced-type trailers.

operating industrial-tractor systems, there is sure to be a great deal of abuse, and if the maintenance cost is to be kept down, a machine capable of day-in and day-out operation must be purchased. While first cost of the equipment should be considered, $200 or $300 difference in the purchase price is soon eaten up by the maintenance required by an inferior machine. One method by which to judge price is to figure the first cost of the machine on a per-pound basis, taking into account, of course, whether the weight of the machine is all in ruggedness of construction or whether there is a lot of superfluous weight which does not strengthen the machine.

The frame is an important consideration and also the axle suspension. The frame should be made of channel iron hot-riveted together and with strong cast braces. The axle suspension should allow for free spring action, but should also be designed so that it will maintain the alignment between the axle and the frame under all operating conditions.

Of all electrical parts, the motor is the most important, since the working capacity of a machine is practically determined by the combination of motor and battery. Of course, it is impossible to specify any particular motor. If a certain tractor is bought, that manufacturer's standard motor is furnished; but in purchasing it is well to make certain of one point, and that is that the motor has sufficient capacity to handle the work without overheating. The motor should have a rating which will enable it to operate continuously for at least thirty minutes at 300 per cent over the rated capacity. The motor should also be totally inclosed for protection from dust. It would be well to compare the brush and commutator sections of the various makes.

The controller should be inclosed, but the cover should be arranged so that it can be easily removed for frequent inspection. The contacts should be of large section and the fingers should have heavy tips in order to dissipate the heat generated by the large currents which are carried. The spring which holds the controller fingers against the drum should not be required to carry the current, as this might heat the spring, causing it to lose its temper. A flexible conductor should, therefore, be provided.

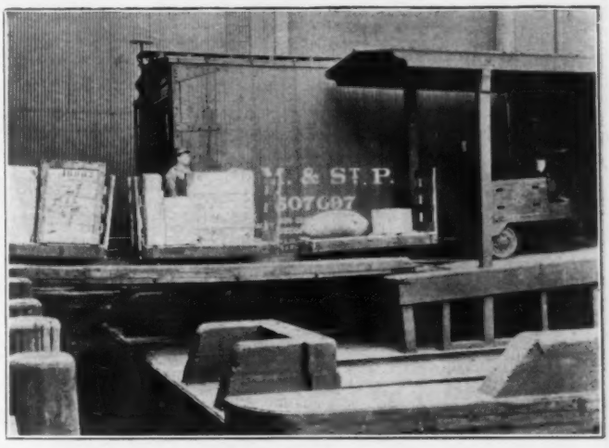
The automatic switch should operate in such a manner that whenever the operator leaves the tractor the power will be automatically cut off and may not be applied again until he has returned to his seat and returned the controller to the neutral position. In addition to the main contacts which should be of large cross-section, there should be auxiliary contacts which will do the actual making and breaking of the circuit. As these auxiliary contacts will wear rapidly, they should be designed so as to be easily replaceable.

The brake should be strong enough to bring the tractor and load promptly to a dead stop and should set automatically when the operator leaves the tractor. Two brakes are preferable, one for ordinary service and the other as an emergency brake.

In order that the tractor may start easily, the wheels should turn on individual yokes with the turning centers approximately directly over the center line of the tire. All steering connections and other movable parts not fitted with ball or roller bearings should be equipped with renewable bushings which can be replaced after the machine has been in service for a sufficient time to cause wear. This is an important point as it greatly lengthens the life of the machine and reduces maintenance expenses.

One of the most important factors to be considered when an installation of electric tractors or trucks is contemplated, and one which has been looked upon by many as a "box of mystery," is the storage battery. Many men who are not acquainted with electrical matters are afraid to adopt industrial trucks simply because of the battery. There is no substantial reason behind this feeling because there is nothing at all mysterious about a storage battery. Millions of them are in daily operation in starting, lighting and ignition service on automobiles, and every driver of an automobile knows how little trouble his battery actually gives him. In fact, there is hardly a car owner who finds it necessary to do more than add fresh water occasionally.

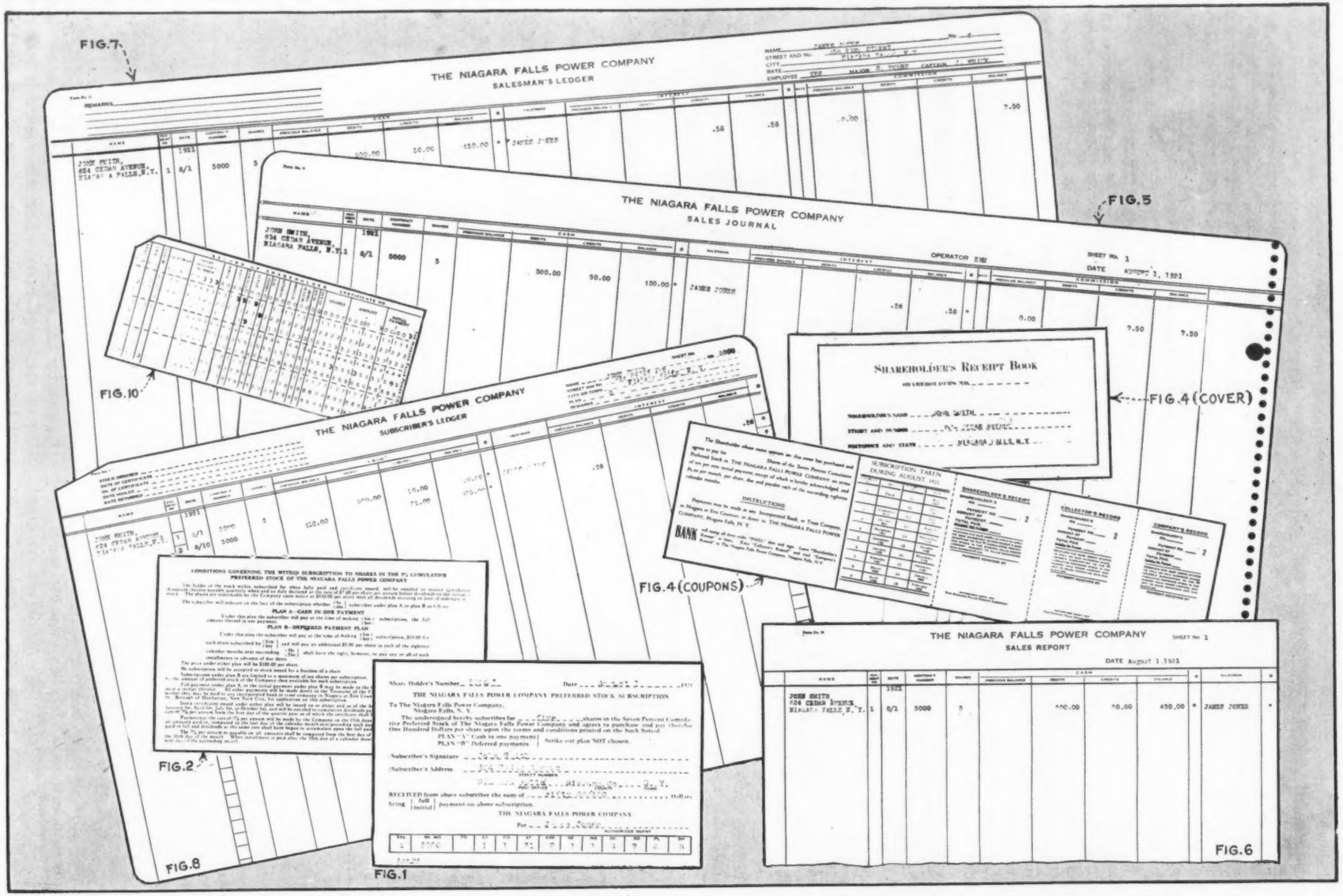
Two general types of batteries are used for industrial tractors—the nickel-iron and the lead. The nickel-iron battery is very commonly used because it will



LOADING A STEAMSHIP WITH MISCELLANEOUS FREIGHT; LOAD IS CARRIED TO DESTINATION ON THE TRAILERS

stand all sorts of abuse, has a long life and cannot be injured through faulty charging. This type of battery is furnished in several styles and sizes, the most common being the Edison type A-6, which has a capacity of 225 amp.-hr. For heavier duty, where more work is required of the tractor than can be taken care of by a single charge of the A-6 cell, the type A-8 with 300 amp.-hr. capacity is used. The internal resistance of the nickel-iron battery is very high, and this is particularly noticeable during heavy discharge, since the voltage falls off materially, causing the tractor to slow down. For this reason the Edison Storage Battery Company has developed the type G cells, which are recommended for installations where there are steep grades to climb. The G-9 cell has the same capacity as the A-6 and the G-11 slightly less capacity than the A-8.

The smallest size of lead battery which is recommended for industrial tractor service is the fifteen-plate, which has approximately the same ampere-hour capacity as the A-6 Edison cell. For heavier work, requiring more capacity, the 17-plate, 19-plate and 21-plate cells are used. On account of the low internal resistance this battery will hold up the voltage and consequently the speed of the tractor even when operating at very high rates. For this reason it is a very good battery for installations where there are heavy grades to be negotiated. In such cases the 19-plate or 21-plate sizes are recommended.



THE FACE OF THE RECORDS REQUIRED IN ACCOUNTING FOR THE SALE OF STOCK ON EITHER THE CASH OR DEFERRED-PAYMENT PLAN UNDER THE SYSTEM DEVELOPED AND NOW IN SUCCESSFUL OPERATION BY THE NIAGARA FALLS POWER COMPANY

Accounting for Customer-Ownership Sales

Detailed Plan of a System of Accounting for Sales of Shares of Stock on the Deferred-Payment Plan Suitable for the Public Utility Corporations Now Engaged In or Contemplating Such Campaigns

By W. PAXTON LITTLE, C. P. A.
Treasurer Niagara Falls Power Company

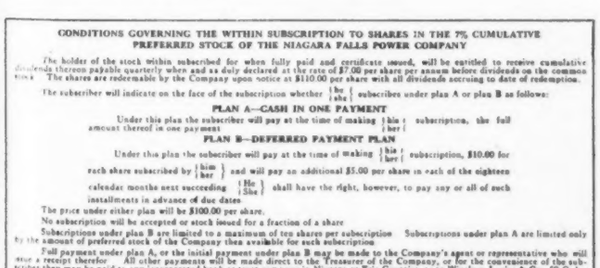
METHODS of accounting for sales of shares of stock by utility corporations direct to customers or to the public in the vicinity in which they operate are of absorbing interest to the accountants of such corporations now engaged in customer-ownership campaigns and of those contemplating similar sales. The comparative novelty of the problem and the consequent lack of practice by many corporations in such accounting, as well as the volume of work entailed if sales to "small-lot" customers reach large proportions, make a simple, effective and economical method of accounting most desirable.

The Niagara Falls Power Company, being a wholesaler of electrical energy, has not the large number of customers that would be attached to a retail business, and therefore in its recently inaugurated campaign for the direct sale of its preferred stock was obliged to make its offer to the general public in the territory served by it. This condition entailed features of accounting that perhaps would not be met with by corporations whose subscribers are composed largely of their customers.

Prior to the campaign for the sale of stock the system of accounting about to be described was devised, and since then it has been successfully operated. This system would seem to be adaptable to any project of selling securities on the deferred-payment plan. The prominent and attractive features of the method are:

1. The reciprocal convenience to the subscriber and the company in their dealings with each other and the consequent avoidance of misunderstanding by the subscriber.

2. The facilities afforded the company in its transactions with its agents and subscribers.



CONDITIONS GOVERNING THE WITHIN SUBSCRIPTION TO SHARES IN THE 7% CUMULATIVE PREFERRED STOCK OF THE NIAGARA FALLS POWER COMPANY

The holder of the stock within subscribed for when fully paid and certificate issued, will be entitled to receive cumulative dividends thereon payable quarterly when and as duly declared at the rate of $7.00 per share per annum before dividends on the common stock. The shares are redeemable by the Company upon notice at $110.00 per share with all dividends accruing to date of redemption.

The subscriber will indicate on the face of the subscription whether {he / she} subscribes under plan A or plan B as follows:

PLAN A—CASH IN ONE PAYMENT

Under this plan the subscriber will pay at the time of making {his / her} subscription, the full amount thereof in one payment

PLAN B—DEFERRED PAYMENT PLAN

Under this plan the subscriber will pay at the time of making {his / her} subscription, $10.00 for each share subscribed by {him / her} and will pay an additional $5.00 per share in each of the eighteen calendar months next succeeding {He / She} shall have the right, however, to pay any or all of such installments in advance of due dates.

The price under either plan will be $100.00 per share.

No subscription will be accepted or stock issued for a fraction of a share.

Subscriptions under plan B are limited to a maximum of ten shares per subscription. Subscriptions under plan A are limited only by the amount of preferred stock of the Company then available for such subscription.

Full payment under plan A, or the initial payment under plan B may be made to the Company's agent or representative who will issue a receipt therefor. All other payments will be made direct to the Treasurer of the Company, or for the convenience of the subscriber they may be paid to any incorporated bank or trust company in Niagara or Erie Counties, or to Winslow, Lanier & Co., 59 Cedar St., Borough of Manhattan, New York City, for application on this subscription.

Stock certificates issued under either plan will be issued on or about and as of the first day of the quarter years beginning with January 1st, April 1st, July 1st, or October 1st, and will be entitled to cumulative dividends payable quarterly when and as declared at the rate of 7% per annum from the first day of the quarter year as of which the certificate shall have been issued.

Payment at the rate of 7% per annum will be made by the Company on the 15th days of January, April, July, and October, upon all amounts paid in, computed to the last day of the calendar month next preceding such payment until the subscription shall have been paid in full and dividends at the same rate shall have begun to accumulate upon the full paid stock issued to the subscriber.

The 7% per annum so payable on all amounts shall be computed from the first day of the calendar month when paid on or before the 10th day of the month. When installment is paid after the 10th day of a calendar month, such computation will be made from the first day of the succeeding month.

FIG. 2 — REVERSE OF STOCK SUBSCRIPTION CONTRACT, LISTING CONDITIONS OF BOTH CASH AND DEFERED-PAYMENT PLANS

3. The ability to obtain promptly information in any particular, due to the fact that no delay occurs between the receipt of subscription contracts, deferred payments, etc., and the entry of data relating thereto.

SPECIAL TRAY WHICH IS USED FOR FILING LEDGER SHEETS WITH EXTENSION TO PERMIT OFFSETTING SHEETS FOR REFERENCE

4. The daily balancing and proving of the accounts.

5. The daily report of sales in detail to executives.

6. The use of mechanical devices wherever economically possible.

7. Neatness and legibility of the records.

8. Economy and accuracy.

The accounting for sales of preferred stock on the "cash-payment plan" presents few, if any, difficulties, and the details of our method in connection with such accounting are therefore omitted. The "deferred-payment plan," on the contrary, involves a great deal of work on the part of the accounting department, and the remainder of this article consequently is devoted entirely to the accounting for such sales. It will be noted that the system deals with the method of accounting for sales under specific conditions embodied in the subscription contract.

The Contract.—Fig. 1 (face), Fig. 2 (reverse) is printed in triplicate and bound in book form. The original is for the files of the company, the duplicate is for the subscriber, and the triplicate is retained by the salesman for his record. In formulating this contract the endeavor was to state the terms and conditions as

briefly and simply as possible, having in mind the accounting required in connection therewith.

The special features of the contract to which it is deemed necessary to call attention are:

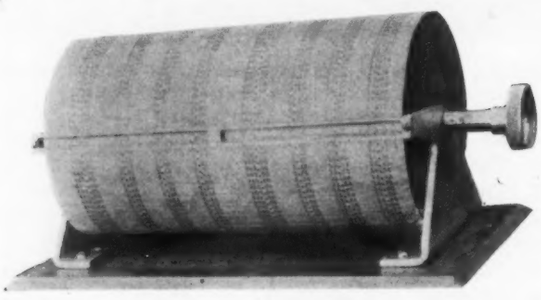
1. The arrangement by the company with incorporated banks and trust companies in the counties of Niagara and Erie to accept and receipt for deferred payments.

2. The provisions as to "payments at the rate of 7 per cent per annum" upon all amounts paid in and as to the computation of such 7 per cent payments.

The arrangement with the banks and trust companies was a most desirable one for the convenience of the company and its subscribers, since the company has not the contact with its subscribers afforded by the relations of an electric light or gas company with its customers. It makes it possible for any subscriber to pay installments at any bank.

The provision that "7 per cent per annum payments" will be allowed from the first day of a calendar month when installments are paid on or before the tenth day of that month, and from the first day of the succeeding month when paid after the tenth day of the month, was inserted to simplify computation of such "payments at the rate of 7 per cent," as well as to stimulate the interest of subscribers in making their deferred payments promptly. It will be observed that the provision made for the issue of stock certificates as of the first days of the quarter years and the provision made for the computation of the "payments at the rate of 7 per cent per annum" each quarter eliminate any complication between such payments and the payments of dividends on the stock. For legal reasons the word "interest" has not been used, and the phrase "payment at the rate of 7 per cent per annum" has been substituted.

Method of Accounting for Contracts and Initial Payments.—The subscription contracts (original), together



COMPUTING CYLINDER WHICH CARRIES THE COMPUTATION OF 7% PER ANNUM ON ANY INSTALLMENT PAYMENT UNTIL THE BEGINNING OF THE NEXT QUARTER

with the initial payments, are delivered by the sales department to the cashier each morning. The cashier verifies the payments and enters in his cash book the aggregate amount received.

The contracts are then passed to the stock subscription clerk, who indicates upon them the amount which will have accrued at the end of the current quarter at the rate of 7 per cent per annum, computed from a chart (Fig. 3), and the amount of the commission to which each salesman is entitled. He then extracts from the contracts the data for a letter to be sent by the treasurer to each subscriber, welcoming him as a partner in the enterprise and inclosing the shareholder's receipt book (Fig. 4), which contains a formal acknowledgment of the subscription and initial payment.

The contracts are next transferred to the operator of an Elliott-Fisher bookkeeping machine. This machine is a flat-platen adding machine and typewriter combination, and the sheets upon which the accounting data are to be recorded are placed on the platen as follows:

Sales journal (Fig. 5).
Sales report, three copies (Fig. 6).
Salesman's ledger sheet (Fig. 7).
Subscriber's ledger sheet (Fig. 8).

By the use of carbons the entries appearing on these sheets are made simultaneously and cover the necessary

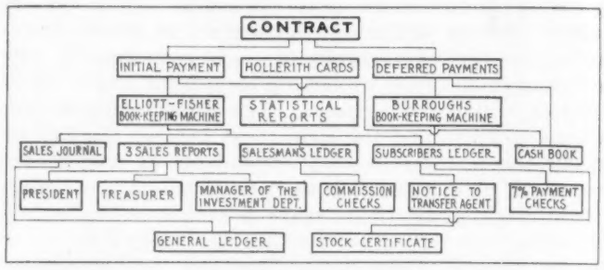


CHART SHOWING ROUTINE OF DEFERRED-PAYMENT SALES ACCOUNT SYSTEM

entries required by the terms of the contract (Fig. 1 and Fig. 2). All of these entries are proved each day, and as soon as the work for the day is completed the sales reports (Fig. 6) are ready for the president, treasurer and manager of investment department. The prompt preparation of these daily records is of vital importance in the guidance of such a campaign.

The filing of the sheets constituting the record is important and is done in the following manner:

Sales Journal (Fig. 5).—These sheets are filed in a loose-leaf binder and constitute the book of original entry from which monthly totals are posted direct to the general ledger.

Sales Reports (Fig. 6).—These sheets are filed in binders in the offices of the president, treasurer and manager of investment department.

Salesmen's Ledger Sheets (Fig. 7) and Subscribers' Ledger Sheets (Fig. 8).—These are filed in trays.

The work of the Elliott-Fisher operator in transcribing the necessary information from the subscription contracts is greatly facilitated by having the ledger sheets of the salesmen whose accounts are affected by previous days' sales offset two or three inches, thus enabling the operator to find quickly an individual salesman's account without reference to the indexes. A portable tray is recommended, and the use of trays so constructed as to permit the ledger sheets being offset is very important.

A number is given to the subscriber upon receipt of his contract by the treasurer, and that number follows him thereafter, appearing on the subscriber's account and record while his name is on the company's books either as a subscriber or a shareholder.

When the operator of the Elliott-Fisher bookkeeping machine completes the transcribing of data above referred to, the contracts are forwarded to the statistical department, where such statistical information as is required is recorded on tabulating machine cards (Fig. 10).

This information is indicated in code on the face of the contract (Fig. 1) and may be gathered by the

salesman at the time of taking the subscription. The code is as follows:

Sal.—Salesman	Se.—Sex
Sh. No.—Shareholder's number	Na.—Nationality
To.—Town	Oc.—Occupation
Ci.—City	So.—Source of inquiry
Co.—County	Pl.—Plan
St.—State	Sh.—Shares
Emp.—Employee	

By the use of Hollerith machines, which are used by us primarily for labor and material distribution, such statistics as are punched on the cards can be quickly tabulated.

Method of Accounting for Deferred Payments.—The shareholders' receipt book (Fig. 4) contains, besides the acknowledgment of the initial payment, eighteen sheets perforated to form three coupons to a sheet. The subscriber is required to present this receipt book when making a deferred payment. One coupon is bound in the cover of the book and constitutes the subscriber's receipt. The second is retained for its record by the bank or agency making the collection. The third is for the company's records and accompanies the bank's or agency's advice of collection.

The work of the bank or agency in this connection consists in receipting the subscriber's book, crediting the company's account with the aggregate amount of receipts from subscribers, and daily forwarding to the company an advice of credit accompanied by the coupons representing the collections.

The stock subscription clerk indicates upon the face of the coupons the amount of the "payment at the rate of 7 per cent per annum" which will have accrued at the end of the current quarter in respect to this particular installment in the same manner as he did in respect to the initial payment. The operator of a Burroughs bookkeeping machine identifies the subscriber's account by the number of the coupons and credits him with the amount of the installment payment and the amount of the "payment at the rate of 7 per cent per annum." A facsimile of this entry in the subscriber's account is shown in Fig. 8. The use of the Burroughs bookkeeping machine virtually eliminates errors in posting and facilitates quick proving of the work when the day's postings are completed.

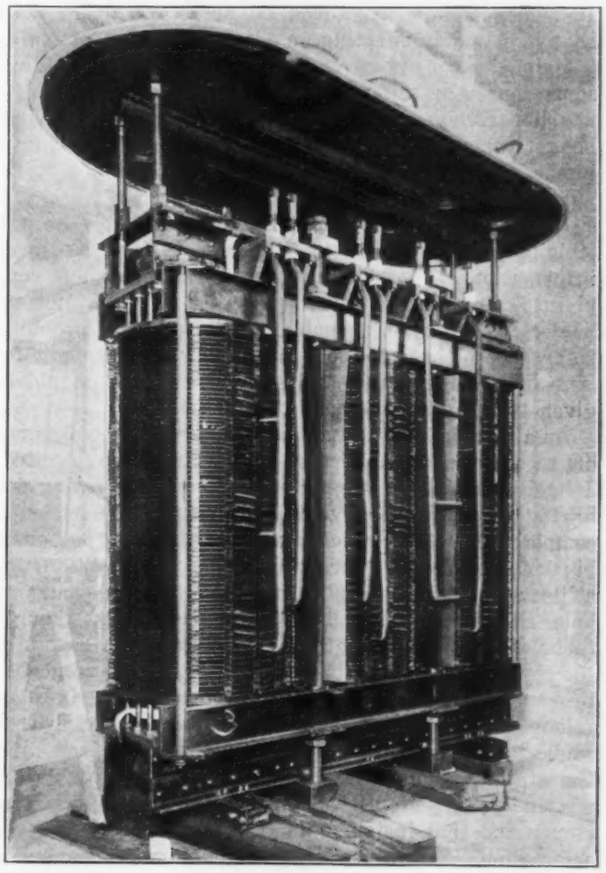
"Payments at the Rate of 7 per Cent per Annum."—Checks for quarterly "payments at the rate of 7 per cent per annum" are printed five to a strip, and the name and address of the payee are inserted with an addressograph. The amount of payment, both in script and figures, is then transcribed on each check in one operation by the use of a Defiance check writer, which is simple in operation and eliminates to a great degree the liability of error. The checks are signed with a "signagraph," separated, and placed in "window" envelopes ready for mailing. The Burroughs bookkeeping machine is used in debiting the subscribers' accounts with these payments, as well as for debiting salesmen's accounts with payments covering their commissions.

Issue of Stock Certificates.—Upon the completion of his payments by the subscriber and the surrendering of his receipt book, the company notifies its transfer agents and requests them to issue to him the certificate of stock to which he is then entitled. The transfer agents forward the certificate to the subscriber by registered mail, at the same time notifying the company; whereupon the subscription account is closed and the subscriber appears as a shareholder of record.

The chart presents a clear picture of the balanced plan of this accounting system for customer-ownership stock sales on deferred payments. It is the result of a very careful and deliberate study and has proved itself exceedingly accurate and economical. Not one error has occurred so far in the course of our campaign involving the customer in any way. This degree of practical perfection is due not alone to the correct planning of the system in its theory, but to the selection of mechanical devices that are exactly suited to the work. The bookkeeping machine, check writer, signagraph, filing trays, coupon books and record sheets all contribute to the orderly operation of the system and produce prompt reports that are "news and not history." The proper training of operators for the bookkeeping machines is, of course, most important, but no difficulty is found if the operator has bookkeeping sense. It is far easier to teach a bookkeeper to use the machine than to attempt to teach a machine operator bookkeeping.

Our experience has been most fortunate, and the facility with which this system has operated has won it the enthusiastic support of the entire organization, the selling men as well as the accounting staff.

Auto-Transformers Have Copper Capacity of 50,000 Kva.



TWO of these auto-transformers are installed at the Conners Creek station, Detroit Edison Company. They are three-phase, water-cooled, oil-insulated units with voltage ratio of 12,000/24,000 and reactance of about 8 per cent. Operated as ordinary transformers, with primary and secondary insulated, the rating is 25,000 kva.

Letters from Our Readers

This is a readers' forum. Comments on questions before the electrical industry presenting economic, financial, engineering or commercial aspects and new or supplementary viewpoints on published articles are cordially invited

Emphasize the Desire to Serve

To the Editors of the ELECTRICAL WORLD:

Before any appreciable amount of good will can be realized by utilities there must be a perfect understanding between the consumer and the company. Even the smaller patron must be assured of a desire to serve him and of an interest in him that extends further than his meter. Furthermore, these expressed desires must be put into practice continually by all company representatives coming into contact with the customers.

There must be no "passing the buck" to other departments, no shifting of responsibility. Such practice far from satisfies the consumer and may even exasperate him. This fact must be observed in all cases whether the consumer has cause for complaint or not. In some cases it may even be necessary to go more than half way in effecting an adjustment of a complaint.

Help the consumer understand his meter—tell him some causes of difference in monthly readings. If he has not received meter-reading instructions, see that he gets them before he leaves the office. Explain to him several readings in such a manner as not to bewilder him with technical terms.

In the case of complaints learn as definitely as possible the exact facts in the case. Give as much information as possible and in case of a serious complaint convince the customer that it will not be neglected. Serious complaint should be promptly referred to the head of the proper department for immediate adjustment, and special attention should be given to the prevention of its repetition.

As an example of the attitude that might be assumed on receiving a complaint the following case is cited: John Blank entered the office one Monday morning following a storm the evening previous. He violently complained that too much power had been turned on in his house—that a fixture was melted, parts falling on a library table, scarring it, and some hot parts burning holes in a fine rug. At first the occurrence was thought to be the result of lightning. However, the report of the service department indicated that the wind had broken a large limb from a tree and that this limb had fallen on the lines, bringing them into contact with a series street-lighting circuit. Upon comparison with the station records, it was observed that trouble appeared on this circuit at the time stated by the consumer and that instruments indicated a ground at the same time. The cause of the trouble was clearly explained to the customer, his fixture repaired and the tree trimmed. Whereupon he was satisfied, despite the fact that he first demanded a new rug and table and even threatened a lawsuit.

A company cannot hope to gain the friendship and respect of its consumers unless it can convince them that it is the company's desire to give a square deal. Personal contact of management and customer is of vital importance in adjusting complaints, although all complaints do not demand it. Those that do can be easily ascertained. Letters "referring to previous correspondence" are really worse than no attention. They serve to induce a belief that the complaint is being evaded or side-tracked. Instead of such a reply there should be endeavor to explain the situation clearly so that there will be no ground for future misunderstanding.

When the consumer gains an understanding of the importance of the utilities and realizes that they do not have boundless capital, that they have bills to pay and are limited as to profits, public utilities will receive consideration without so much complaint and grumbling.

There should be an understanding that the welfare of the utility reflects the welfare of its own immediate community, the customer's own welfare, and that they are in the business of serving the public—public servants, if you like. From these facts there can be no escape. In order to prosper, utilities must so operate as to improve these mutual relations and thus inspire the confidence and respect of their customers.

O. R. TOMAN,
Manager.
Bedford Light, Heat & Power Company,
Bedford, Iowa.

Electric Smelting of Iron Ore

To the Editors of the ELECTRICAL WORLD:

A statement was made at a recent meeting of the officers of the American Mining Congress in Washington by Charles W. Potts, mine operator, of Bearwood, Minn., that "present known reserves of high-grade iron ore, based upon constantly expanding requirements of the steel industry, will be exhausted in twenty years, and the merchantable grades of iron from the great mines of Minnesota will be, at the present rate of depletion, practically exhausted within the next fifteen years unless new discoveries are made." If, as Mr. Potts states, our available high-grade iron ore will be depleted in twenty years, is there not also a grave danger that our position today in the world's markets will pass, unless the vast deposits of iron sands and low-grade ores in this country are properly exploited? Other countries—China, Japan, Brazil, India—with cheap labor, have immense deposits of iron ore. They have water power available and already are installing large smelting furnaces operated electrically for reducing the iron ores.

The electric smelting furnace—using cheap water-generated power—will very probably in the next few years open up a vast supply of iron ore at present considered almost worthless. Immense deposits of iron sands and low-grade ores occur in the Adirondacks, on the Pacific Coast and in many other parts of the country. These ores are at present useless, as they cannot be economically treated in the ordinary standard blast furnace. Most of these deposits are in places where power is or could be generated very cheaply; the ore can be concentrated and smelted into iron by specially designed electric furnaces.

There are several known and proved processes for electric iron smelting, chief of which is the Swedish "Electrometall" process. Already twenty-seven large installations, with a total capacity of 100,000 kw., are running or under construction in various parts of the world. This type of electric smelter uses the gases generated in the melting zone to preheat and partially

reduce the charge. It does not attempt to make steel direct, but in several cases the product is being tapped out into metal mixers or open-hearth furnaces and from there into finishing electric furnaces. Dr. Stansfield in his report on the commercial feasibility of electric smelting of iron ores in British Columbia writes:

"In Sweden the 'Electrometall' type of electric smelting furnace has proved very satisfastory for the production of low silicon pig iron. This is, as far as I am aware, the only type of electric furnace that has attained commercial success in the production of pig iron from ores. If a permanent smelting plant were being erected, the Swedish type of furnace would be selected."

Considerable publicity has been given recently to what was termed a recent Japanese discovery that iron sand and low-grade ores could be smelted and made into steel. There is absolutely nothing new in this so-called Japanese invention, since as long ago as 1907 John T. Jones of Iron Mountain, Mich., devised a similar process for treating low-grade ores. H. A. Greaves and H. Etchells, English scientists and inventors of the successful "Greaves-Etchells" electric steel furnace, also brought out a process a few years ago in which black iron sand was passed down a rotating tube or kiln and from there to a finishing electric furnace. The ore in this tube is preheated and partially reduced by the gases given off in the electric furnace. Finished steel from sand has repeatedly been made by their process. A French inventor, M. Basset, uses a similar method, but in his case external or additional heat is applied to the ore proceeding through the preliminary tube.

As long as good high-grade ore is available and coke reasonable in price, these electric processes of ore reduction cannot hope to compete with the standard blast furnace in anything but charcoal iron—or iron of special analysis. With the falling off in available supplies of high-grade ore and the generation of cheap electric power from water power, the electric smelters will come into their own. They can undoubtedly make iron superior in quality to that made in the standard blast furnaces. Very thorough tests made in Sweden and England with this electrically made pig iron also proved that by its use in the open-hearth furnaces considerable time could be saved in the steel-making operations. Actual figures have not been published, but in a number of cases that came directly under the writer's notice the saving in time per heat of steel was between one and one-half and three and one-half hours.

Although the initial cost of electric pig iron may still be somewhat higher than ordinary blast-furnace pig iron, yet considerations such as that mentioned above and the extreme purity of the electric iron do not make the difference in first cost as large as would at first appear. The electric smelter can also economically handle a very large proportion of turnings, borings and cheap scrap in its charge—material that is not suitable except in small proportions in the standard blast furnace.

In districts like the Pacific Coast, where good ore is available near cheap, water-generated electric power and where at present most of the coke, pig iron or steel has to carry heavy freights from the East, there is a splendid opening for some one with far-sighted enterprise to put down electric smelters and steel plants.

Probably the future method of making even cheap steels will be to take hot-blast furnace metal, from either electric or standard blast furnaces, directly into a large metal mixer, where additions of ore, cheap borings and turnings could be made, and from there to a Bessemer converter, where the metal would receive a partial blow only, and the deoxdizing and finishing off would be done very quickly in a series of electric furnaces. In the process outlined there would be virtually no loss of heat in the whole operation. The addition of ore and cheap scrap in the form of borings, etc., in the mixer would cause a thermic reaction and generation of heat, the Bessemer operation would add more heat, and all that the electric furnace would have to do would be to deoxidize, adjust temperature and, where necessary, refine or make additions of alloys. The writer is confident this process would make the cheapest steel in the world.

FRANK HODSON,
Electric Furnace Construction Company, President.
Philadelphia, Pa.

Economy of Ball Bearings in Relation to Power Factor

To the Editors of the ELECTRICAL WORLD:

One of the principal reasons for the increasing use of ball bearings in induction motors is the various ways in which these bearings produce economy in service. It is generally understood that because starting friction in the case of ball bearings is low the initial current consumed will be lower with ball bearings than with plain bearings. In many cases, too, decided economy has been obtained in lubrication, both in the frequency of applications and the amount used. In a few instances ball bearings are used because they allow a shorter motor to be built than would be possible with plain bearings, and a saving of space and material is thus effected.

Another important saving, however, which ball bearings allow is the reduced current permitted in induction motors. This is due to the fact that a shorter air gap can be used with ball bearings than is permissible with plain bearings. It has been definitely proved that the air gap on ball-bearing induction motors may safely be decreased to a very few thousandths of an inch. With plain bearings this would almost inevitably entail burned insulations, overheated motors and ruined windings if the bearings became worn in the least degree.

It is quite possible to compute the saving which this reduction makes possible in the case of any particular motor. Take, for example, a 10-hp. motor of conventional design manufactured by one leading American company. The primary current drawn at half load with an air gap of 0.022 in. is 15.1 amp. and the power factor 75 per cent. Ball bearings allow this gap to be cut in half. By means of a circle diagram plotted on cross-section paper the current, after the gap is reduced, is found to be only 12.5 amp., while the power factor has increased to 90 per cent. No-load current decreases from 9.5 amp. to 5 amp.

Moreover, the wattless current absorbed by the motor decreases by about 12 per cent at full load and 50 per cent at no load, which would mean a further saving in power-house equipment. The great improvement of power factor at half load is particularly valuable since industrial motors generally operate at far less than their rated capacity.

In view of this decided economy in current consumption, decreased friction and low cost of lubrication, ball bearings in induction motors deserve more thought.

New York City. C. I. HEIKES.

Industrial and Station Practice

Installation, Operation and Maintenance of
Generating and Distribution Equipment and Economical Utilization of Electrical Energy
in Mills and Factories, Including Testing and Repair Methods

Long-Distance Water-Level Recorder

A WATER-LEVEL recorder that produces an accurate record at a distance of 9,000 ft. from the steam gage is in use at the United States Geological Survey station on the Kaw River at Topeka, Kan. The station was equipped with experimental instruments in the fall of 1918 and from that installation the present one has been developed. The wiring of the instruments has been so arranged that only two wires between the gage and the registering instrument are needed and these wires serve also as a telephone circuit. Fig. 1 shows the complete wiring diagram. The instrument at the river, called the sender, has two swinging mercury-contact devices, one of which is actuated through a flat perforated steel tape connected to the float in the gage well every time the float rises one-twentieth of a foot. The other contact is closed every time the float falls the same distance. The armatures of two magnets on the register (Fig. 2) are operated by impulses sent through the circuit by the operation of the two contact-making devices. One magnet operates in each direction. The armatures are connected through a ratchet and wheel to the chart cylinder, which is turned about its axis by the movements of the armatures to represent the rise or fall of the water level. The ratchet wheel turns only one notch at a time. The recording pencil is carried in a rigid holder that is driven by an eight-day clock along the length of the chart cylinder.

Operating current for the sender is taken from a 110-volt line through a lamp resistance. The telephone instruments are local-battery, bridging-wall sets. Between the receiving instrument and the receiving telephone 500-ohm impedance coils are inserted in the circuit. These prevent disturbance of the sensitive magnets on the receiving instrument by the bell ringer. Condensers in series with the telephone bells prevent current from the sending instrument crossing through the telephone and operating wrong receiving magnet.

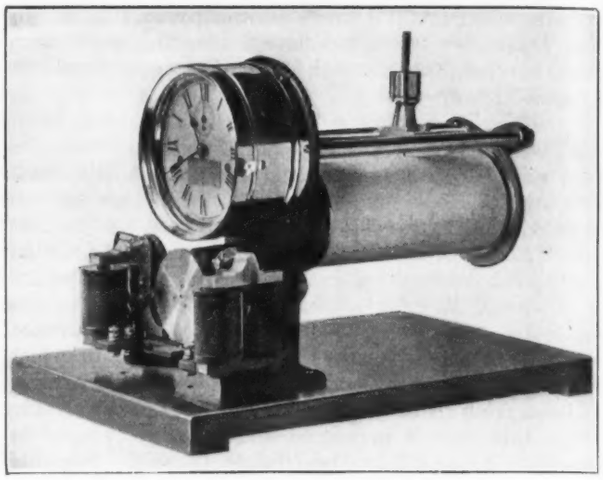


FIG. 2—REGISTERING INSTRUMENT AT WEATHER BUREAU OFFICE

The gage has been in constant service since the spring of 1919 with no operating troubles. Roger C. Rice, district engineer of the United States Geological Survey, now at Phoenix, Ariz., has been responsible for the development of the Topeka installation, while S. D. Flora, meteorologist of the Weather Bureau station at Topeka, has co-operated in the work.

Chicago, Ill. FIELD EDITOR ELECTRICAL WORLD.

Exciter Characteristics Cause Paralleling and Regulator Trouble

SOME time ago the Springfield Light, Heat & Power Company experienced considerable difficulty in paralleling two of its exciters and in obtaining proper operation of the Tirrill regulator used therewith. Both of the exciters are motor-driven, one being rated at 100 kw. and the other at 75 kw. Nearly every attempt

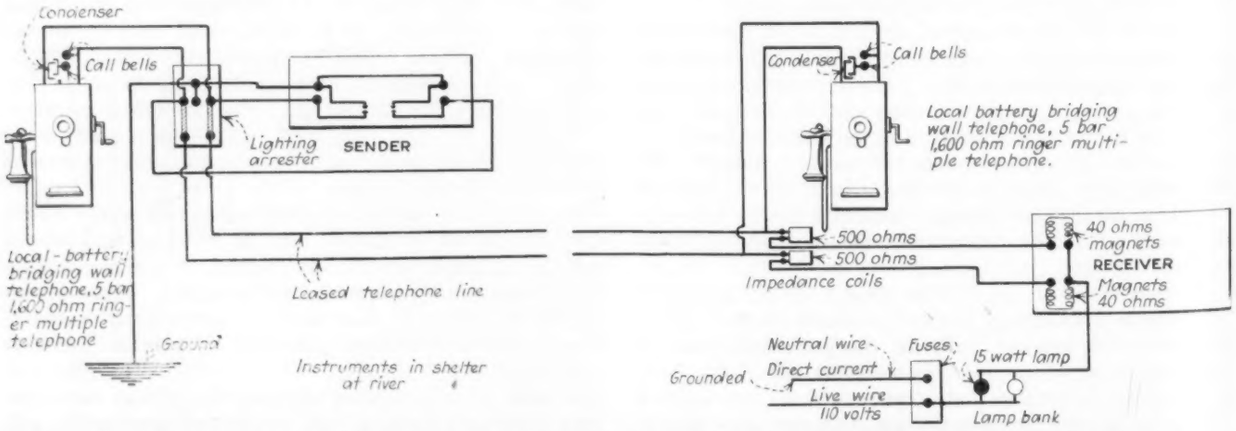
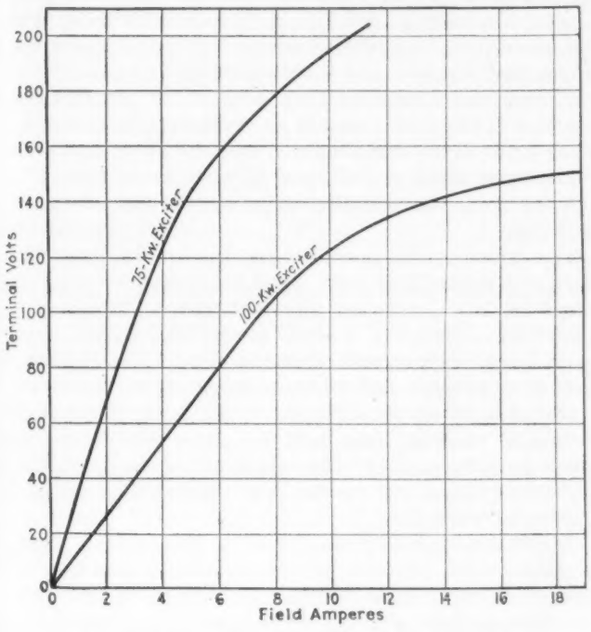


FIG. 1—WIRING DIAGRAM OF LONG-DISTANCE WATER-LEVEL RECORDER WHICH USES SAME WIRES AS TELEPHONE LINE

to parallel the two exciters resulted in a plant shutdown because of the failure of the excitation. It was also found that under certain conditions of operation the Tirrill regulator was unable to maintain the bus voltage at normal value when operating in conjunction with the 100-kw. exciter. At about 75 per cent load



NO-LOAD EXCITATION CURVES OF TWO EXCITERS

on either or both of the two small alternators which were used the bus voltage would sag under ordinary power-factor conditions. As a result the larger exciter was used as little as possible, even though its use might have been desirable at times on account of its greater rating. Emergency excitation is provided by a 35-kw. steam-driven outfit.

To determine the reason of the failure of the exciters to parallel, no-load saturation curves of exciters were obtained from the respective manufacturers. These are shown in the accompanying illustration, where the curves are superposed for convenient comparison. The reason for the inability to parallel is very evident.

To determine the reason for the failure of the Tirrill regulator to maintain normal bus voltage when operating with the 100-kw. exciter, tests were made under load conditions, using various combinations of load, power factor and machines in service. One 2,000-kw. machine was made to take a load of 1,500 kw. at 60 per cent power factor. Under these conditions the exciter voltage rose to a limit of 141, the regulator sticking and causing the bus voltage to sag. The other 2,000-kw. machine was then put on the bus and made to circulate current, but not permitted to take load. The exciter voltage immediately dropped to normal and the bus voltage rose to normal. The explanation is that the unloaded machine supplied a magnetizing cross-current, lagging with respect to itself but leading with respect to the loaded machine. This current served to help the exciter and relieve it of part of the work. Next the load was divided between the two alternators, making the load on each so small that its inherent regulation did not reduce the voltage to the point where the regulator was unable to cope with the situation. Had the load on each machine been of the same value as on the one in the first test, the trouble would still have made itself evident, as was demonstrated by a later test made under this very condition. The machines were able to carry higher loads without difficulty as the power factor rose.

The explanation of the regulator trouble lay in the demagnetizing action of the load current, which was accentuated at low power factors and which demanded an exciter voltage beyond the range of the 100-kw. exciter. No trouble was experienced with the 75-kw. exciter under any conditions of loading.

The trouble was remedied by first changing the shunt on the series field of the 100-kw. exciter and finally completely removing it from the circuit. Either of the 2,000-kw. machines was then made to carry a load of 2,500 kw. at 75 per cent power factor. Under this condition the regulator was very sluggish, but since it is not the usual practice to operate the alternators above full-load rating, the operation under normal conditions was satisfactory. It was also found that the cable from the 100-kw. exciter to the switchboard was of insufficient capacity, giving about 9 volts drop at full-load rating of the machine. Changes in accordance with the indications of the test made have resulted in fairly satisfactory operation, even under adverse conditions of operation.

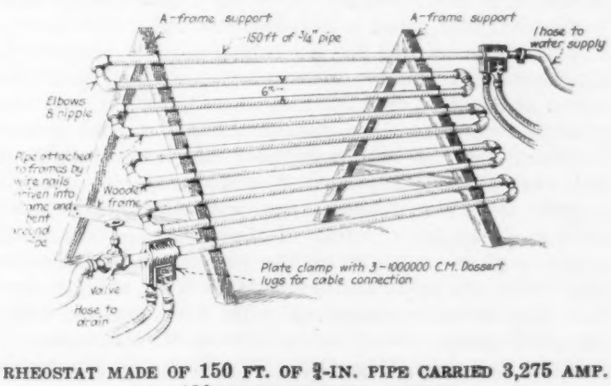
L. E. BROWN,
Production Manager.

Springfield Light, Heat & Power Company,
Springfield, Ohio.

Water-Cooled Pipe Makes Good Rheostat for Heavy Load

IN THE ELECTRICAL WORLD for April 9, page 827, there was described a water-barrel rheostat for testing exciters. At this plant it is the practice to make use of water pipe for such tests. A load test was made recently on a 400-kw. 125-volt exciter. The rheostat was made up of ¾-in. pipe arranged on a wooden rack and connected up zigzag fashion with elbows and nipples as shown in the accompanying sketch.

This rheostat was made of nine standard lengths of pipe from 16 to 17 ft. in length, so that the total length with end connections was approximately 150 ft. No attempt was made to cut the pipe to a uniform length, but it was connected up as it came. Connection was made to the rheostat by plate clamps grooved to fit the pipe. Cooling water was circulated through the pipe by means of rubber-hose connections. The water supply was at a pressure of 55 lb. It was possible to adjust the temperature of the pipe by regulating the amount of water passing through by means of the valve shown. In this way a certain amount of varia-



RHEOSTAT MADE OF 150 FT. OF ¾-IN. PIPE CARRIED 3,275 AMP. AT 130 VOLTS WITHOUT TROUBLE

tion of resistance could be obtained. At the full load of 3,275 amp. the temperature of the outgoing water, with the valve wide open, reached a temperature of 90 deg. C.

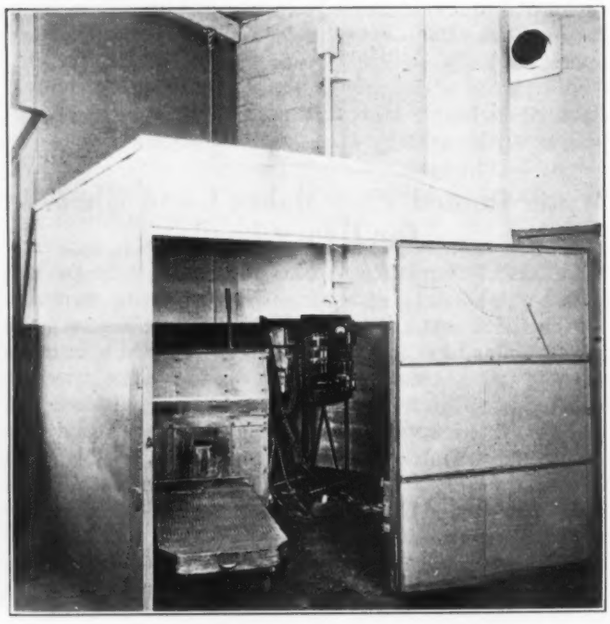
This rheostat handled an output of 3,275 amp. at 130 volts for four hours without signs of distress. After the test was over the material was returned to stock.

C. R. REID,
Powerhouse Superintendent.

Shawinigan Water & Power Company,
Shawinigan Falls, Quebec.

Charging Station Installed on Inter-Factory Bridge

TO DO away with transporting an industrial electric truck upon a local elevator for battery charging, the Graton & Knight Manufacturing Company, Worcester, Mass., installed a charging station in one corner of an inclosed bridge connecting two of its buildings and in close proximity with floors requiring the service



THIS BOOTH FOR CHARGING IS PLACED ON BRIDGE BETWEEN TWO BUILDINGS ON LEVEL ON WHICH TRUCK WORKS

of the truck at frequent intervals. A portion of the inclosed passage is also used as a locker room. To set apart the charging equipment the metal housing shown herewith is provided, the top being screened. Service to the charging panel is provided for this 2-ton Elwell-Parker truck by two No. 40 rubber-covered cables run through rigid conduit attached to wooden bases by metal straps as indicated. At the top of the run the conduit terminates in a split junction box with halves fastened together by bolts and nuts, this enabling the box to be easily opened and the cables carried around the short 90-deg. turn without other conduit fittings. Regular scrutiny of the truck and charging panel is given at night by the watchman, and the inclosure of the apparatus protects it from outside contact and prevents tampering with it by persons without authority.

A. H. MAGNUSON,
Electrical Engineer.

Graton & Knight Mfg. Co.
Worcester, Mass.

Mercury-Vapor Lamps in Satisfactory Installation at Hosiery Mills

A SAVING of 370 watts of lighting energy per machine lighted was effected by a recent installation of Cooper Hewitt lamps at the Susquehanna Hosiery Mills, Philadelphia. This was not the only advantage gained, however, as the Cooper Hewitts did away with the necessity of individual lamps for the separate machines and supplied and evenly diffused light similar to that obtained under skylight conditions. In fact, the foreman of the mill is quoted as having said that one day when a thunderstorm occurred and the room was without natural light the Cooper Hewitts were turned on and the room was actually better lighted than from the skylights.

The machines in question are for embroidering hosiery and range from 15 ft. to 25 ft. in length. They are placed in rows, with an aisle between. They may be described as being in a sense double-decked, the upper part of the machine embroidering one lot and the lower part another lot, a fact which makes lighting them with artificial light rather difficult. The Cooper Hewitts are so placed that at least half the tube illuminates the lower deck, furnishing sufficient light for the operator to see the stitches and to observe whether the needle is sewing properly.

Light was formerly supplied by incandescent lamps arranged on a basis of 800 watts to a machine. The Cooper Hewitts were installed on a basis of 430 watts to a machine, there being sixteen 50-watt incandescents to one Cooper Hewitt. The mill foreman states that the light is very easy on the eyes of the operatives and that it reaches to the lower deck of the machines, which the light from the skylight did not do.

W. J. WINNINGHOFF,
Engineer.

Cooper Hewitt Electric Co.,
Hoboken, N. J.

Energy Consumed by Electrochemical and Metal-Refining Processes

IN THE accompanying tables are given the energy consumption required for the electrochemical production of various materials and that for melting and refining metals. The low cost of this energy together with the superiority of the product produced electrically has resulted in an ever-widening application of electricity. Among the electrochemical products perhaps the most important are nitrates and nitrites, caustic soda, aluminum, zinc, ferro-alloys, calcium carbide, oxygen, hydrogen and chlorine.

Smelting, melting and refining applications are

POWER REQUIRED FOR ELECTROCHEMICAL PRODUCTS

Material	Kw.-Hr. per Ton	Material	Kw.-Hr. per Ton
Aluminum	30,000	Ferro-silicon (50 per cent)	5,000
Alundum	2,000	Ferro-silicon (75 per cent)	10,000
Barium oxide	1,200	Ferro-tungsten (70 per cent)	7,600
Cadmium	2,500	Ferro-uranium (40 per cent)	8,000
Calcium carbide	4,000	Ferro-vanadium (35 per cent)	6,800
Calcium cyanamid	3,750	Graphite	7,800
Carbon bisulphide	850	Iron, electrothermic	2,500
Carborundum	8,500	Iron, electrolytic	4,000
Caustic soda, 2,000 lb. / Chlorine, 1,760 lb.	3,000	Lead	145
Copper, electrolytic, refining	300	Magnesium	27,000
Copper, electrolytic reduction	2,600	Nitric acid	17,500
Ferro-chromium (60 per cent)	8,000	Phosphorus	12,000
Ferro-manganese (76 per cent)	5,000	Potassium chlorate	1,350
Ferro-molybdenum (60 per cent)	8,400	Sodium	20,000
		Sodium chlorate	7,000
		Tin, electrolytic refining	175
		Zinc, electrolytic	4,000

POWER REQUIREMENTS FOR MELTING AND REFINING METALS

Material	Kw.-Hr. per Ton	Material	Kw.-Hr. per Ton
Aluminum	500	Cast iron	450
Brass	300	Cast steel	600
Bronze	330	High-speed steel	750

steadily growing in importance. This is recognized when it is remembered that the first electric furnace for refining steel was installed in 1904, at which time it was regarded as a laboratory device. Today furnaces are made rated at 40 tons and capable of pouring 65 tons. Twice this capacity is already talked of for the near future.

JOHN A. SEEDE,
Power and Mining Engineering Department.
General Electric Company,
Schenectady, N. Y.

Correct Temperatures Must Be Held in Babbitting Motor Bearings

TO PRODUCE reliable and dependable babbitted bearings the workmen must be trained, the babbitt metal carefully selected, temperatures kept within fixed limits, and the tinning process and handling of the shells, mandrels and metals during the heating and pouring processes must have careful study. In general the various babbitts most commonly used to line motor bearings divide themselves into two distinct classes of alloy, known as a tin-base and a lead-base babbitt alloy. They usually contain from 80 per cent to 90 per cent of tin or lead respectively as their principal elements. Both classes of metal appear to give good results in service when they are properly made and subsequently properly handled during the melting and pouring processes.

Tin-base alloys for babbitting have been hitherto more generally used as experience shows this type of alloy to be less affected by a wide range of temperature during the heating and pouring process. Thus, with less care and attention paid to the details in babbitting, very satisfactory results can be obtained. Bearings which will give very good results in service can be produced with certain grades of a lead-base alloy when heated and poured within definite fixed-temperature limits and when all other conditions, such as tinning, heating of mandrels and shells, etc., are kept right. In fact it has been noted that under certain test conditions certain lead-base alloys make a better showing than the tin-base metals as to their ability to stand up under successive hammer blows. Moreover, tests show that some lead-base alloys have better anti-friction properties than the tin-base alloys.

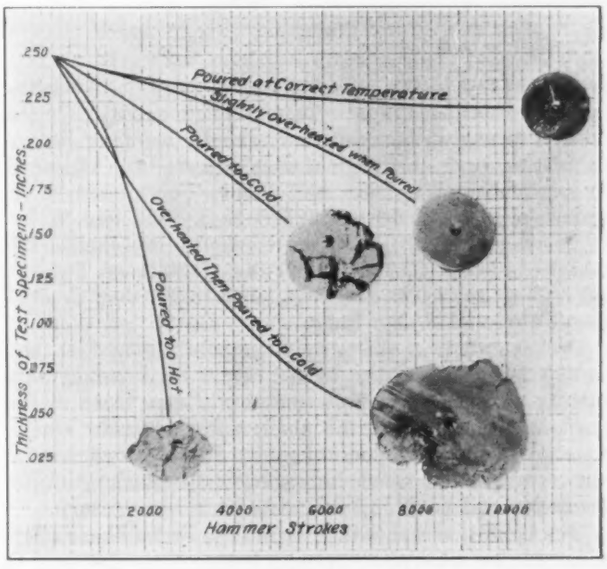
In babbitting bearings all operators seem to follow the same general practice, but there is a universal tendency to neglect details in connection with such points as (1) properly cleaning and tinning bronze shells, (2) preheating of mandrels and shells before babbitting, (3) correct temperature of the alloy, (4) handling and pouring of alloy in bearing shells, and (5) reliability of the source of supply of babbit metal.

There are very few shops that have babbitting pots equipped with temperature-indicating devices, and this important detail is left entirely to the judgment of the workman, who determines the proper temperature limits of heating and pouring by some of the following means, based more or less on intuition: (1) Use of a pine stick (the most common practice), (2) use of a piece of paper, (3) color of the metal, (4) condition of the surface of the heated metal, and (5) appearance and by stirring with a ladle.

As this subject is of vital importance, it seems advisable to outline in detail the method used by a large manufacturing company which has been worked out and developed after many years of experience and careful study. It has been found that this method is applicable to one of each of the more common and well-known tin-base and lead-base alloys and if carefully followed will give very satisfactory results.

The tinning alloy, half-and-half solder, is melted in an iron or steel pot, in which the temperature of the metal should be maintained between 410 deg. and 440 deg. C. (770 deg. and 824 deg. Fahr.). The tinning alloy should not be heated above 450 deg. C. (842 deg. Fahr.). If the pot is used only occasionally, cover the melted alloy with sawdust or charcoal to prevent the formation of dross. The metal should be stirred frequently when being used and always before using after standing for any length of time in a molten condition.

This tinning operation consists of coating the surface to be babbitted with a thin film of half-and-half solder.



LEAD-BASE BEARING METAL POURED UNDER VARIOUS CONDITIONS AND SUBJECTED TO HAMMER TESTS

The machined parts that are not to be tinned should be coated with a thin mixture of red clay and water. When dry, swab the parts to be tinned with zinc chloride. (saturated solution of zinc in hydrochloric acid), then dip into the tinning solution. Leave the shell in the pot until it is just hot enough for the tinning alloy to run off. Remove the shell from the pot and thoroughly rub the surface to be tinned with zinc chloride, making sure that all parts have a thin coating of the alloy, and that no untinned spots are left on the surface to be babbitted. Immerse the shell again in the tinning alloy to remove the acid left from the swab and do not swab or otherwise touch the tinned surface again, but babbitt immediately.

In tinning bronze shells that are not to be babbitted treat them as outlined above except after their second immersion in tinning alloy the tinned surface should be cleaned with waste to remove any oxide or other foreign matter and the graphite brushed from the untinned parts.

It is not common practice to tin iron shells, although it can be done. Instead anchor holes are depended upon to hold the babbitt securely to the shell. All anchor holes should be cleaned well so that the babbitt will be held firmly in place. Standard anchor holes should be generous in number and should be near the ends and at the edge of the bearing windows of all shells in order to hold the babbitt securely at the edges.

Mandrels should be heated to prevent chilling of the babbitt when poured, and should be coated with a thin wash of red clay mixed in water to prevent the babbitt

CORRECT TEMPERATURES FOR POURING BABBITT AND FOR SHELLS, MANDRELS, ETC.

	Correct Temperature, Deg. C.	Do Not Exceed, Deg. C.
Tinning alloy	410–440	450
Mandrels:		
For tinned solid-bronze shells	100–125	.....
For tinned split-bronze shells	125–150	.....
For split or solid-iron shells	240–270	.....
Shells:		
Iron	200–250	.....
Bronze	See note*	.....
Babbitt	460–482	490

* Temperature of tinning alloy.

from sticking to the mandrel and to prevent blowholes in the babbitted lining. This coating can be applied with a brush or a swab and should be done before babbitting each shell. Best results have been obtained by preheating mandrels as follows: For tinned solid-bronze shells, 100 deg. to 125 deg. C. (212 deg. Fahr. to 257 deg. Fahr.); for tinned split-bronze shells, 125 deg. to 150 deg. C. (257 deg. Fahr. to 302 deg. Fahr.); for split or solid-iron shells, 240 deg. to 270 deg. C. (464 deg. Fahr. to 518 deg. Fahr.).

Preheat all iron shells to a temperature of 200 deg. to 250 deg. C. (392 deg. to 482 deg. Fahr.) before babbitting so that the babbitt metal will flow close to the shell and also permit the shell and babbitt to shrink together and avoid loose babbitt. All tinned bronze shells must be poured immediately after the tinning operation and no additional preheating is necessary.

The babbitt metal, either a tin-base or lead-base alloy, must not be allowed to become hotter than 490 deg. C. (914 deg. Fahr.) at any time, and it should not have any other alloy mixed with it. Use a pyrometer for determining the temperature, and wherever possible use a regulator for controlling the temperature of the metal in the babbitting pot. Melt the alloy in an iron or steel pot and maintain the temperature when in use between 460 deg. and 482 deg. C. (860 deg. Fahr. to 900 deg. Fahr.). Mix the metal thoroughly from the bottom of the pot as soon as melted, again at frequent intervals when being used, and always just before using after the metal has been standing in a molten condition for any length of time. If the pot is used only occasionally cover the babbitt with sawdust or charcoal to prevent the formation of dross.

Ordinarily pour all bearings in a vertical position unless the irregular shape of the bearing makes this position inadvisable, in which case incline the bearing at the most suitable angle and pour at the most convenient point. In pouring a split bearing at an angle the parting face should be on the under side resting on the jig. The metal should be poured from a self-skimming ladle in a steady stream directly along the mandrel to avoid the pocketing of air.

Small blowholes, if few in number, should be filled in with the babbitting metal by the use of a hot soldering iron. If blowholes are large in size or number or if seams have formed the lining should be melted out and the bearing rebabbitted. Remove the excess babbitt which may have stuck around the windows with a hot soldering iron.

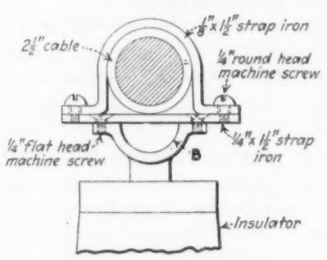
Too much stress cannot be laid upon the importance of maintaining certain definite temperature limits to which the bearing metal should be heated. Experience has shown that a perfectly good metal can be made almost worthless for bearings by allowing it to become hot, also by pouring when too hot or too cold. This is more applicable to a lead-base than to a tin-base alloy. As an example of just what will happen to metal poured under varying temperature conditions, a series of tests were made on a lead-base alloy by subjecting test pieces of the metal 1 in. (2.5 cm.) in diameter and ¼ in. (6.2 mm.) thick poured under different temperature conditions to a series of hammer blows. The results of these tests, which are shown in the curves, plainly tell their own story.

In order to maintain temperatures at the proper values a thermocouple connected to an indicating millivoltmeter which is calibrated in degrees centigrade or fahrenheit is inserted in an iron tube which is placed in the molten metal. A further development of this outfit has an automatic attachment which controls the temperature by regulating the flow of the gas. This scheme is by far more reliable owing to the fact that once adjusted it requires no further attention but works automatically.

A new type of soldering pot in process of development is heated by electricity and equipped with an automatic temperature control. On this pot the temperature is controlled by means of a chemical contained in a metal tube anchored in the pot, which changes from an insulator to a conductor between a predetermined range in temperature.

J. S. DEAN,
Motor Engineering Department.
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

Adapting Insulator Clamp for a Cable Which Is Too Large



A 2-IN. INSULATOR CLAMP ADAPTED TO HOLD A 2½-IN. CABLE

RECENTLY when supporting a length of 2½-in. cable in a substation of a large manufacturing company all insulators designed for this size cable were used before the job was completed. There were on hand, however, some insulators for 2-in. cable and these were used as shown in the accompanying cut. The upper half of the original clamp was discarded, and by means of flat-head screws a length of ¼-in. by ½-in. strap iron was bolted in its place. This formed a seat for the U-shaped strap made of ⅛-in. by 1½-in. iron, under which the cable was clamped. This held the cable securely and answered the purpose satisfactorily.

FRANK HARAZIM.
New York City.

Management and Policy

Embracing Central Station Commercial Organization and Management, Customer and Trade Relationships, Public and Financial Policies, Advertising, Selling and Service Methods

Free Trouble Service Found Best at Hartford

FIFTEEN years of free trouble service has convinced the Hartford (Conn.) Electric Light Company of the wisdom of handling this class of work without charge except where major failures of apparatus or wiring require subsequent reporting to contractor or manufacturer for attention. In 1920 the "trouble-shooting" staff handled 20,981 calls with about 40,000 connections to the system. Three men working nine hours six days per week, with a fourth man working part time in rush periods and a fifth as a substitute, care for this service. Forty-seven per cent of the total number of calls are classified as "fuses blown, cause unknown," against 15 per cent classified as trouble in appliances, sockets or fixtures, 11 per cent short circuits in wiring, sockets or fixtures, and 1 per cent motor trouble.

Salt Lake Gives a Good Example of a Well-Chosen "Home Electric"

RECENT examples of the "Home Electric" have shown conclusively that one of the biggest elements in their success is the selection of a well-designed house, generously furnished and in good taste. Salt Lake City has just conducted such a demonstration in a small Colonial cottage.

The home contained approximately 150 electrical outlets and nearly fifty switches. A number of guides were

LIVING ROOM OF SALT LAKE ELECTRICAL HOME

provided who explained to the visitors the wiring installation and the practicability and convenience of each outlet and appliance in every room. In a prominent place in the house a sign was displayed reading "No solicitation, demonstration or quotations made during this exhibition. Information will be cheerfully furnished by any electrical dealer."

The home was conducted under the direction of the Rocky Mountain Electrical Co-operative League. L. B. Swaner designed and built the house, and electrical manufacturers, jobbers and dealers contributed to make it a success.

Tenney Companies Sponsor Employee Educational Efforts

PUBLIC utility companies in the Charles H. Tenney & Company (Boston) group are embarking this fall on a policy planned to give the utmost encouragement to employee educational efforts. An educational director has been appointed for each company and charged with the responsibility of co-operating with employees taking various courses with the National Electric Light Association, Edison Electric Appliance Company, Alexander Hamilton Institute, International Correspondence Schools or other trade and accounting institutions. It is the policy of the company to meet such employees at least half way in relation to personal expenses involved.

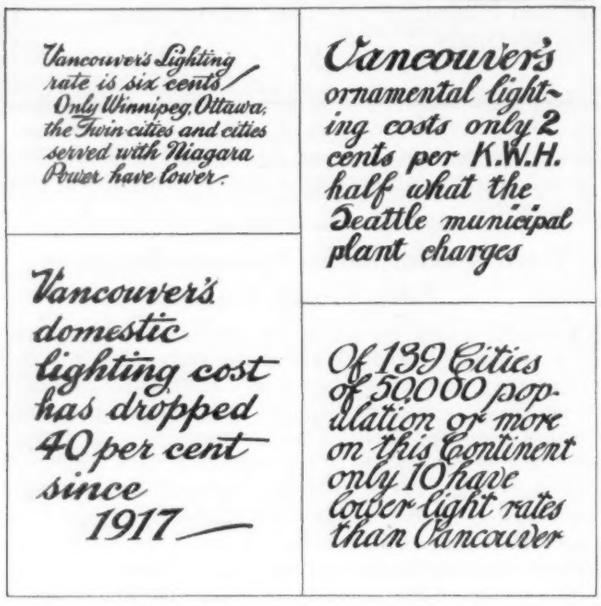
It is not intended to advance the money before such courses are completed, but on presentation of certificates showing that the work has been accomplished financial encouragement will be given in approved cases along the above lines. It is also planned to provide lectures on many subjects of interest and value to utility employees during the coming winter, and plans have been formulated whereby representatives of manufacturing companies in the electrical field will speak to groups of employees on the principles and detailed application of their products. Much educational work was interrupted by the war, and the importance of recruiting future leaders in these companies from the ranks of ambitious workers is fully recognized by their executives. About fifteen utility companies, chiefly in New England, are concerned in this program.

Vancouver Advertises the Inexpensiveness of Its Service

CORRECTION of local impressions that its rates are high is the object of a series of advertisements now being run by the British Columbia Electric Railway Company, Vancouver, B. C. During the last year or more the company has been advertising extensively to increase its lighting business, and results have proved the value of the policy. It became evident, however, that there still lingered in the minds of some a more or less well-defined feeling that the company's rates for light, power and gas were high, and it was felt that such delusions must be dispelled. A series of advertisements, some of which are shown here, was prepared. Each advertisement carried one salient fact emphasizing the low cost of the company's service. These advertisements were run in street cars and in the daily papers. Each card remained in the cars one week, while it appeared printed in script in the daily papers one day during the same week.

Following this campaign, other advertisements giving

the cost of using certain sizes of lamps were run. Explanations were made as to how any one might figure out for himself or herself the actual cost of a lamp. On such advertisements the slogan "Light costs little—use more" was used. It is believed that when the public realizes how inexpensive electric service really is one of the deterrents to the use of more light and to the sale of more electric appliances will be removed.


Vancouver's Lighting rate is six cents. Only Winnipeg, Ottawa, the Twin cities and cities served with Niagara Power have lower.
Vancouver's ornamental lighting costs only 2 cents per K.W.H. half what the Seattle municipal plant charges
Vancouver's domestic lighting cost has dropped 40 per cent since 1917
Of 139 Cities of 50,000 population or more on this Continent only 10 have lower light rates than Vancouver

TYPICAL ADVERTISEMENTS EMPHASIZING LOW COST OF ELECTRIC SERVICE

Prize Emblem Features Pittsfield Electric Service

AN EFFECTIVE emblem sign advertising electric service was recently installed by the Pittsfield (Mass.) Electric Company on the roof of its main office building. The design was the result of a prize competition for the best emblem that could be used for signing automobile plates, letterheads and company badges, which was won by a motor repairman. It consists in roof-sign form of an equilateral triangle with 10-ft. metal sides, finished in black, with a white center of inclined white-enamel steel at the apex of which is mounted a 500-watt incandescent lamp with a steel reflector. The sign is illuminated nightly until 11 o'clock and, with the corner-window display illumination at the company's office, has attracted no little attention. W. A. Whittlesey is manager of the Pittsfield company.

EMBLEM SIGN ADOPTED BY PITTSFIELD COMPANY

What Other Companies Are Doing

Reading, Pa.—Improvement of business in the territory served with electric light and power by the Metropolitan Edison Company is shown by the fact that in July and August the Metropolitan Edison Company signed contracts for more power than in the preceding seven months. During August, when the total power signed was twice the amount in July, five Reading industrial plants which were formerly operated by their own steam were connected to the electric power service of the company. For the eight months ended Aug. 31 the total of new contracts secured by the Metropolitan Edison Company was 2,714. There were contracts to serve 1,743 old houses and to furnish 1,590 hp. in motors. These figures show a substantial gain over the corresponding period of last year.

Sandusky, Ohio—The station records of the Sandusky Gas & Electric Company show an increased output for the first twenty-four days of September over a like period in August of 220,498 kw.-hr. Approximately 70 per cent of this increase represents new business taken on. The balance is a natural increase due to the greater number of lighting hours and the gradual resumption of business. All of the industries in the city of Sandusky and the surrounding territory report a decided improvement in the amount of orders being received.

Enid, Okla.—C. T. Barber of the Enid division of the Oklahoma Gas & Electric Company recites an incident which shows the growing favorable attitude of the public toward customer ownership. He says: "A few weeks ago a gentleman came into the office and inquired about Oklahoma Gas & Electric securities. After they were thoroughly explained he signed for five shares for his three boys, ranging in age from twelve to seventeen years. He explained that as this was the very best way for the boys to save money, he was going to start them off and they were to come into the office personally and make their own monthly payments."

Greenville, N. C.—Installation of the latest type of incandescent series street-lighting system has just been completed, replacing the old type of street arcs. The main thoroughfares of Greenville are now lighted with 600-cp. nitrogen-filled lamps, while the outskirts of the city are lighted with 400-cp. lamps of the same type. The new system has revolutionized the street lighting of the city. The 600-cp. lamps give about a third more illumination per unit than the old arc lamps, while the 400-cp. lamps give an illumination virtually the same as the old lamps. However, they have been arranged so that they have a uniform distribution of light without the glare and flickering of the old system. The management and officials of the Greenville company, together with the lighting committee of the City Council, have expressed their approval and indorsement of the new system.

Astoria, Ore.—The Pacific Power & Light Company, together with the local electrical contractor dealers and through the co-operation of the Northwest Electrical Service League, will conduct a "home electric" in Astoria during the present month and expects thereby to stimulate the sale of domestic electric appliances and interest the citizens in a greater use of household labor-saving devices.

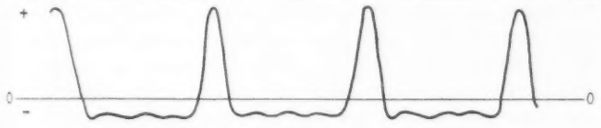
Digest of Electrical Literature

Including Brief Abstracts of and References to Important Articles Appearing in the Scientific and Engineering Press of the World

Generators, Motors and Transformers

Calculating Characteristics of Synchronous Machines.—J. H. KUHLMAN.—Tests to determine the data required to compute complete performance curves and methods to be employed in calculating various values from the readings are explained. Data are given showing the results of tests made on an actual machine.—*Electrical Review*, Sept. 3, 1921.

A New Alternating-Current Generator with Asymmetric Wave.—MAX BRESLAUER.—An electric generator is described which delivers an asymmetric alternating current consisting of a very steep positive part of short duration and a very much smaller negative part of comparatively long duration. This is being achieved by driving synchronously a two-pole inductor within a two-pole field, the latter excited by ordinary sinusoidal



OSCILLOGRAM OF ASYMMETRIC CURRENT WAVE

alternating current. The mechanical coupling between driving motor and driven generator is once for ever established so as to give the maximum distortion of the wave form, this coupling being established with the aid of an oscillograph. Feeding a step-up transformer, such a small motor-generator set is eminently suited to produce X-rays. A diagram showing the construction of the machine and oscillograms of its current wave are given.—*Elektrotechnische Zeitschrift*, Sept. 15, 1921.

Lamps and Lighting

Low-Voltage, Self-Starting-Arc Incandescent Lamp.—MCFARLAND MOORE.—A new self-starting neon-tungsten lamp which will operate on low-voltage circuits consists of two helices of tungsten wire in an atmosphere of neon gas, the ends of the helices being separated by a very short distance. When voltage is put on this lamp there first appears around the electrodes a corona discharge of light having the characteristic red color of neon, and the corona steadily evolves into a horizontal cylinder of intense white light. The output of the lamp constructed is about 178 spherical candles, and the specific consumption becomes 1.08 watts per spherical candle.—Paper presented before Illuminating Engineering Society, Sept. 29, 1921.

Desired Road Illumination from Automobile Headlamps.—H. H. MAGDSICK and R. N. FALGE.—There are presented data derived from thirteen observers and showing the road illumination from headlighting equipment in a moving car under various conditions of road surface, contour, boundaries, street lighting, weather, speeds, etc., with lighting facilities which offered a considerable range of intensity and distribution. These data indicate in a general way the lighting required for safety and a moderate degree of convenience; that is, the lower limit of what might be termed good practice for the more common road conditions. They are not sufficiently complete to permit an analysis of the effect of each of the variable factors. A description is given of the equipment employed, together with an outline of the procedure followed in obtaining the data.——Paper presented before Illuminating Engineering Society, Sept. 29, 1921.

Generation, Transmission and Distribution

Heating of Cables.—P. DUNSHEATH.—The writer states that lack of agreement on the subject of cable heating is due to two factors. On the one hand, numerous results of research and investigation have sprung up and obscured the real problem, and on the other hand, investigators have dealt with the cable and its surroundings as one entity instead of separating them into two distinct problems. With these two facts in mind, he proceeds to analyze and formulate the rise in temperature in cables.—London *Electrician*, Sept. 9, 1921.

Hydro-Electric Construction Sites Along Columbia River.—W. A. SCOTT.—The five natural power sites on the Columbia River between the mouth of the Willamette and the United States boundary line are described. The head and the amount of power available and the cost of development at each of the points are given.—*Electrical Review*, Sept. 3, 1921.

Developments in Power-Station Design.—One of a series of articles describing equipment for power plants. This article describes oil-burning furnaces and the auxiliary equipment which must go with them. The paper says that the conversion of a few boilers in large power houses to oil firing for meeting peak loads is well worth considering. Oil fuel is easiest to handle and is easily stored. The furnaces with an oil-fired boiler are at all times under perfect control and the steaming capacity can be readily adjusted to variations of loads. One ton of oil occupies 38 cu.ft. while a ton of coal occupies 45 cu.ft. When the calorific values are compared, the saving in storage space with oil fuel is more than 50 per cent.—London *Engineer*, Aug. 26, 1921.

Traction

The "1B-B1" Express Locomotives of the Swiss Federal Railways.—W. LÜTHI.—This detailed and elaborately illustrated paper describes one of the forty-one Brown-Boveri locomotives used on different lines of the Swiss Federal Railways. The system is single-phase, at $16\frac{2}{3}$ cycles and 15,000 volts. The engines are designed to pull 300 tons over grades of 26 per 1,000 at 50 km. per hour, while their top speed reaches 75 km. per hour. There are four twelve-pole motors of 500 hp. continuous rating installed on each locomotive, driving in pairs over 1:3.2 gearing two jackshafts from which horizontal rods actuate the drivers. A transformer of 1,730 kva. with

a great number of taps provides eighteen starting positions and the energy for heating the train. To cool the transformer oil is pumped through a set of cooling tubes arranged along both sides of the locomotive. Each main motor has its own 7½-hp. motor-blower set. Provision is made for braking the train on long down grades by short-circuiting the motors over resistors.—*Brown-Boveri Mitteilungen*, September, 1921.

Review of Electric Traction.—FRANK J. SPRAGUE.—A history of the development of electric traction with the influence exercised by different men from Thomas Davenport, the pioneer, up to the present age. The problem of development in technical features is discussed from the earlier days up to the present multiple-unit system and main railroad-line electrification.—*Journal of Franklin Institute*, September, 1921.

Installations, Systems and Appliances

Transformer Oil Sludge.—C. J. RODMAN. — Three types of transformer oil sludge, the asphaltic, the soap and the carbon, are described. Poor oil, containing unsaturates, water, small resinous bodies and certain accelerators, produces the oxidation of asphaltic and soap sludges most readily. The carbon type of sludge is produced during electrical breakdown. Highly refined oil of the saturated paraffine series, which is carefully filtered when the dielectric strength begins to lower during operation, can be successfully used for many years.—Paper presented before American Electrochemical Society, Oct. 1, 1921.

Internal-Combustion Engines in Marine Service.—CHARLES EDWARD LUCKE.—This, the second part of an article, compares various forms of propulsion for steamships, including electric drive. Data are given in the form of tables, curves and charts, showing costs of equipment, operating expenses, dead-weight distribution, cargo capacity per single voyage per ton-mile, annual operating expenses, annual return on investment, etc.—*Journal of Franklin Institute*, August, 1921.

Electrophysics and Magnetism

Application of Electrophysics to Ordnance Problems.—GORDON F. HULL.—Methods of measuring the velocity of projectiles by electrical means are described. Electrical apparatus has also been developed for measuring the pressure in a gun and the expansion of a gun during firing.—*Journal of Franklin Institute*, September, 1921.

Magnetic Force in Disconnecting Switches.—H. B. DWIGHT.—An explanation of the forces which exist in disconnecting switches tending to throw the switches open on passage of current. Formulas and curves are given.—London *Electrician*, Sept. 2, 1921.

Electrochemistry and Batteries

Factors Influencing the Electrolysis of Organic Compounds.—RAYMOND FREAS.—A contribution attempting to encourage further research and study of organic compound electrolysis. The discussion, limiting itself to electro-reduction processes, states that the concentration of a "depolarizer" relative to that of active hydrogen or H —, as well as H +, determines the nature of reduction possible. The factors influencing the relative velocities of reaction are enumerated, and in spite of their great number the author maintains that it is possible to obtain selective reduction electrolytically. An experimental arrangement used, and adaptable to continued study, is presented.—Paper presented before American Electrochemical Society, Oct. 1, 1921.

Telegraphy, Telephony and Signals

Reinforced Concrete Poles for Radio Antennas and High-Voltage Transmission Towers.—J. LEROY.—This short paper describes a novel design of high-tension and radio towers of reinforced concrete. The skeleton of the structure is built up of steel tubing held together by concentric steel rods. The finished steel construction is embedded in wooden molds for the concrete, which are so equipped as to give a hollow square pole with a number of openings on the four sides. Such a tower has a pleasing appearance and may be built for any strength desired by choosing proper steel cross-sections. For an actual case—a tower of 25 m. height, to carry two 100-sq.mm. three-phase lines—the complete calculation and drawings are given.—*Revue Générale de l'Electricité*, Aug. 27, 1921.

Direction Finding by Wireless.—J. J. BENNETT.—This paper describes several methods of using wireless telegraphy for guiding ships and aircraft.—London *Electrician*, July 29, 1921.

History of the Electric Signaling System Within the Arlberg Tunnel.—L. KOHLFÜRST.—In this unusual article the almost endless troubles experienced with an electric signaling system installed in the 6-mile (9.6-km.) Arlberg Tunnel, through which are operated trains driven by steam locomotives, are described in detail. It was very difficult to find properly designed cables, relays, bells and telephone apparatus sufficiently rugged to withstand the effects of great moisture combined with the acid fumes from the locomotives. Amid the vast amount of details there may be mentioned the fact that a telephone cable which when installed measured 8,000 microhms resistance per kilometer from copper to lead sheath dropped in six years to only 0.2 microhms.—*Elektrotechnische Zeitschrift*, Aug. 25, 1921.

Maritime Radio Service in France.—J. BRUN.—This service was inaugurated in 1904 and comprises today eight stations on French shores and one in Algiers. Each station has its own definite sending territory. A short description is given of each of these radio posts with photographs of four of them showing the arrangement of the antennas. Finally the author deplores the great noise caused by the many sending stations operating day and night, virtually all on a 600-m. wave, and suggests that designated wave lengths be used for specific purposes. This, he claims, would help materially to aid clear and easy reception.—*Radio Electricité*, August, 1921.

Miscellaneous

Electric Conservation of Fodder.—F. RUTGERS.—The Swiss Oerlikon Works have acquired the patents of a new method to conserve vegetable fodder in silos. At the bottom of the silo is placed a large metallic electrode, upon which freshly cut grass, clover, corn, beet leaves, etc., are piled to the desired height, a metallic cover serving as upper electrode. Between these two electrodes a low-voltage alternating current of from 200 volts to 500 volts is applied for a few days or nights, which kills all bacteria either directly by the current or by the developed heat. The conservation of 10 tons of fodder requires between 130 kw.-hr. and 200 kw.-hr. Several years of actual trial have proved this method to be far superior to any other means of keeping fodder in silos without previous drying. The steady night load is welcomed by power stations.—*Bulletin de l'Association Suisse des Electriciens*, August, 1921.

News of the Industry

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields With Announcements and Reports of Association Meetings and Conventions

Salt Lake's New "White Way" Lighting System Completed

SALT LAKE CITY'S new "white way" lighting unit has been completed, and on the evening of Oct. 5, with appropriate ceremonies and with 30,000 spectators in attendance, Mayor Neslen threw on the current switch. A civic celebration was held in connection with the turning on of the lights.

The new installation consists of 336 6.6-amp. luminous-arc lamps of 1,500 cp. each on steel ornamental standards, three lamps to each pole, the top lamp being 25 ft. above the street and the two lower lamps each 18 ft. above the street. The cost of the installation is approximately $150,000, of which the city will pay 10 per cent, the Utah Power & Light Company $50,000, and the merchants the remainder, this arrangement being made under the provisions of a new state law which specifies that street-lighting districts may be created and paid for by a special tax against abutting property. The maintenance cost will be shared by the merchants and the city, the city paying 10 per cent. The payment of the cost of installation will be distributed over a three-year period.

Plans are being formulated to light many more city blocks in a similar manner, and it is predicted that in another two years the intensely illuminated area of Salt Lake City will be double its present size.

Colorado River Plans of the Southern California Edison

THE Southern California Edison Company has filed an application with the Federal Power Commission for two additional power sites on the Colorado River. Including the filings on the four former sites, the total power contemplated in this series of projects equals 3,400,000 hp. The two new filings cover the Boulder Canyon dam site and the Pyramid Canyon dam site, further down stream and above Needles, Cal. The plans call for a 450-ft. dam at Boulder Canyon and a 200-ft. dam at Pyramid Canyon.

The filings on these sites bring directly to an issue the plans of the city of Los Angeles, which has filings on the Boulder Canyon site now pending before the Federal Power Commission. The plans of the Southern California Edison Company call for a comprehensive development of the river from a point near the southern boundary of Utah and continuing through the entire State of Arizona. A storage reservoir of more than 40,000,000 acre-feet is proposed at Glen Canyon, the upper point, which would be large enough to regulate the river over a complete cycle of wet and dry years. Below this the several power sites would be developed as the demand for power grew. Although the final plans have not been announced, it is understood that coincident with the construction of the first portion of the Glen Canyon dam, ultimately to be 500 ft. high, a generating station would be built lower down on the river and nearer the load centers.

The Pyramid Canyon site would be about 200 miles from Los Angeles and the Boulder Canyon site 250 miles. Recent studies of the latter indicate that the unit there would be the first completed and would be connected to Los Angeles by a double-circuit steel-tower 220,000-volt transmission line.

State Ownership of Hydro-Electric Power Still Agitated in California

PLANS to place on the California general ballot in November, 1922, the initiative petition proposing state-owned hydro-electric power have been developing but slowly. Headquarters of the organization of politicians who are fostering this movement have been opened in San Francisco and Los Angeles and funds are being solicited to carry on the work of obtaining signers to the petition. The organization is backed by men who, it is said, are interested in possible hydro-electric power sites which later might be sold to the state. The petitions are being circulated in a small way and must have more than 80,000 signatures before the measure can be placed on the ballot.

An indirect campaign against the measure is being undertaken by the California power companies, which are holding meetings of their stockholders at which facts about the companies are being presented by their officials. The meetings are being held in various centers throughout the state, and it is confidently expected that the tens of thousands of such consumer stockholders will have a material effect upon the results of the election.

Good Service Best Weapon Against Public Ownership, Says J. A. Laing

THE most effective weapon which the utilities have for combating municipal ownership agitation, declared John A. Laing, vice-president of the Pacific Power & Light Company, speaking before the first regular joint meeting of the year of the Portland (Ore.) Sections of the A. I. E. E. and N. E. L. A. and the Oregon Association of Electrical Contractors and Dealers, on "Regulations Under the Oregon and Washington Utilities Acts," is efficient and reliable service at the lowest consistent cost. Mr. Laing recommended that thought be given to some plan whereby stockholders of a utility might be rewarded for efficient management and penalized for inefficient management of their organization, and expressed the opinion that better results might be obtained from a commission appointed by the Governor than from the elective system that now exists in some states.

A. S. M. E. Backs Fund for Preparation of Accurate Steam Table

REALIZING the trouble caused engineers by the wide divergence in the value of the properties of steam given in the various steam tables in use by constructors and operators of steam machinery both in America and abroad, the American Society of Mechanical Engineers has agreed to be the custodian and administrator of a "steam table fund." The research committee of the association will supervise the work of investigation and the calculation and preparation of the table when the data are obtained. It is hoped that in this way a more accurate and extended table may be drawn up on which all specifications, tests and operating data of steam machinery can be based.

Any one who is interested in the matter is invited to contribute to the fund, many subscriptions of reasonable size rather than a few large ones being desired. The entire industry, both manufacturers and users, will be represented, and the committee has already sufficient pledges in hand to insure the starting of three out of five subjects of research. Bulletins will be issued from time to time as data are obtained. Arthur M. Greene, Jr., is chairman of the research committee, which may be addressed at the Engineering Societies Building, New York.

California, Alaska and Utah Power Projects Before Federal Commission

A LICENSE for a period of fifty years has been issued by the Federal Power Commission to the Southern Sierras Power Company of Riverside, Cal., covering a power project on the headwaters of Mill Creek in the Angeles National Forest. The project involves the diversion of water from High, Vivian, Falls, Alder and Lost Creeks. The water is to be dropped 2,047 ft. to a power house on Mill Creek. A storage reservoir containing 100 acre-feet would be formed on Falls Creek by the construction of an 80-ft. rock-fill dam.

A special condition of the license is that the construction of the entire project, except the Falls Creek storage dam and reservoir, is to begin by Jan. 1, 1922, and be completed by June 30, 1923. The construction of the Falls Creek storage dam and reservoir is to be begun by Jan. 1, 1925, and completed by the end of that year. The licensee also is required to construct and maintain suitable stream-gaging stations.

The commission has approved an amendment of the license issued to the Alabama Power Company for its project at Duncan's Riffle, on the Coosa River, in Alabama. The amendment allows the inclusion of lands west of the Coosa River, half a mile below the dam site, from which stone for use in building a dam and power house is to be obtained. A special condition of the amendment is that the control of the added land is to remain in the War Department and that operations on it are to be limited to such as may be required in the removal of the stone.

A preliminary permit for a period of fifteen months has been granted to the Unita Power & Light Company of Myton, Utah, covering a 4,800-kw. project on Spring Branch and the Unita River, in Duchesne County, Utah, which is necessary to meet the increased load requirements of the company.

A preliminary permit for two years has been granted to George C. Hazelet of Cordoba, Alaska, for the development of a project at the outlet of Silver Lake in the Chugach National Forest, Alaska. The project involves the construction of a dam across Duck River and a pipe line to convey the water 7,000 ft. to a power house to be built at the head of Galena Bay. The estimated power capacity of the project is 5,000 hp. It is to be used in the operation of a pulp mill.

An extension for one year, or until Oct. 1, 1922, has been granted to the United Mills Company of Hickory, N. C. The preliminary permit covers a power project on Harpers Creek, Caldwell County, N. C. The extension is made so that the permittee may determine in an intelligent manner whether or not the natural flow of the stream is of sufficient volume to justify its development.

Ohio Joint Rules Committee Organization

A FINE example of co-operative work is found in the movement now under way in Ohio to formulate rules to be presented to the commission for adoption in compliance with the recently effective law requiring the commission to promulgate rules and regulations governing overhead construction. The communication, power and railroad interests are all well represented on a general committee by experienced men, and in addition to the formal members of the committee a number of advisory members are subject to call.

A working committee of two members each from the communication, power and railway interests has been formed to carry the burden of the work of preparing and agreeing on the final form of rules to be presented.

Six sub-committees of the working committee have been formed to consider respectively the details of general rules and definitions, communication and signal lines, crossings over steam roads, power-line crossings over steam railroads and communication or signal lines, colinear or joint construction of power and communication or signal lines, and technical data and inductive interference. The sub-committees will work out their respective subjects as far as possible and present their conclusions to the working committee, in which the final decisions for presentation to the general committee will be made. Each sub-committee contains equal representation from all three interests participating in the joint work. Under the requirements of the Ohio law the commission must adopt rules in February, 1922, at the latest.

Joint Meeting of N. E. L. A. and O. E. L. A. Meter Committees Called

A JOINT open meeting of the national meter committee of the N. E. L. A. and the meter committee of the Ohio Electric Light Association, to which all meter-department men are invited, will be held at the Statler Hotel, Cleveland, on Nov. 16. In the morning, besides an address with a discussion, the N. E. L. A. film "Back of the Button" will be displayed. In the afternoon R. C. Fryer will read a paper on the "Value of Meter Department Activities in Central-Station Work," and there will be five-minute talks by visiting representatives and a general discussion of meter department problems.

Railroad Strike Should Not Seriously Affect Electrical Industry

SUFFICIENT coal is in local storage, it is thought, to prevent the possibility of any electric light and power station being forced to close down for want of fuel as a result of the threatened railroad strike. Electric utilities generally try at this season of the year to accumulate their winter reserve of around thirty days' supply. There has been considerable purchasing of coal lately by electric lighting companies for reserve against any such contingency as a strike of railroad employees.

Local stocks of electrical material have been kept very low, but it is doubtful if there will be any shortage unless there should be a strike of considerable duration. There is just the possibility that a strike might upset the distribution of holiday goods, but there is enough time intervening to obviate the occurrence of serious losses.

Electrical manufacturers, generally, have not large stocks of raw materials. However, unless the strike, if it comes, lasts long enough seriously to disarrange all transportation schedules for weeks afterward, these manufacturers will probably not find themselves greatly inconvenienced for materials.

Mine Operator Blames Cost of Coal on Freight Rates

SPEAKING before the American Mining Congress Exposition at Chicago recently, J. D. A. Morrow, vice-president of the National Coal Association, said that, although the bituminous output is now approximately 9,000,000 tons, which in an ordinary year would be an extremely low output, still because of general industrial inactivity throughout the country there is no indication that this output will prove to be insufficient for the country's demands for the winter. The point was brought out by Mr. Morrow that bituminous coal is selling at nearly all the mines in the country at less than the cost of production, but that freight rates, which are about 100 per cent greater than before the war, have greatly added to the ultimate cost to the consumer.

Public Ownership Through Security Sales Approved by Commissioners

AT THE concluding session of the annual meeting of the National Association of Railway and Utility Commissioners held in Atlanta, Ga., last week, M. H. Aylesworth, executive manager of the N. E. L. A. and former chairman of the Colorado Public Utilities Commission, made a profound impression on about 100 commissioners from thirty-two states of the Union through his analysis of "public ownership" of utilities as against ownership by cities or states. He pointed out that the results of public ownership can be observed in many sections, since at present more than a million and a half people own the securities of light and power companies under private management. Under such operation not only are the best interests of security-holding customers represented in the development of electric service to suit the development needs of any community, but there is a correlation of the business of furnishing electric service with all those lines of business activities which the diversified group of security holders represents.

To illustrate the far-reaching effect of the right kind of "public ownership" and the conditions which make it essential to maintain the highest quality of service, Mr. Aylesworth recounted the events of the Pueblo (Col.) flood, where through the efficient organizations of the electric light, power and telephone companies the restoring of service in remarkably quick time shortened the period of distress by many days and aroused a lively appreciation of the public spirit that was displayed, even at risk to life, by company employees and officials. In a fuller realization of the community-building influence of adequate electric service, Mr. Aylesworth maintained, lies the solution of some of the future problems of the utilities, particularly the urgent need for capital to carry out the developments and betterments that are everywhere required. The selling of securities to the public through customer-ownership campaigns he dwelt on emphatically as one of the vital phases of utility financing in the future.

The officers elected for the ensuing year are as follows: President, Carl D. Jackson, Wisconsin Railroad Commission; first vice-president, Dwight N. Lewis, Iowa Board of Railroad Commissioners; second vice-president, Alexander Forward, Virginia State Corporation Commission. Detroit, Mich., was selected as the meeting place of the next convention, which will be held on Sept. 26, 1922.

Customer Ownership and Good Will Interest Southeastern Convention

PROBLEMS of central-station executives were the principal topics discussed at the annual meeting of the Southeastern Section of the National Electric Light Association held at Chattanooga, Tenn., Oct. 17-19. Among nationally known men who took part in the discussion were M. R. Bump, president N. E. L. A.; M. H. Aylesworth, executive manager N. E. L. A.; W. L. Goodwin, assistant to president Society for Electrical Development, and John F. Gilchrist, vice-president Commonwealth Edison Company, Chicago.

Upholding the principle of fair treatment and giving a convincing demonstration to the public of the desire to render honest and efficient service, S. B. Irelan, president of the section, said in his address, are among the most important obligations of the central-station company.

"The public today," he went on, "realizes and appreciates the necessity of our giving continuous electrical service and its importance to the development of the communities and districts. It stands ready and willing to support honest efforts of organized groups of thrifty investors to supply their community with this commodity, but it must be truly informed of the various problems of our business and must realize that it also has a responsibility in the securing of an adequate supply of electrical energy for its community."

John F. Gilchrist, vice-president of the Commonwealth Edison Company, explained the organization of state public information committees in various sections of the country. He gave in some detail the organization and working plans of the Illinois committee, which has pioneered the way.

Under the title "Taking Our Customers Into Partnership," M. H. Aylesworth, executive manager of the N. E. L. A., created much enthusiasm for his viewpoint

that public ownership of utilities of the right sort through the sale of securities to consumers is the solution of many financial and good-will difficulties now facing the industry. The number of holders of these securities is now around 2,500,000.

At the second session F. D. Mahoney, commercial manager of the Alabama Power Company, described the sales campaign launched in June, 1920, to sell 10,000 shares of preferred stock to employees and to the public through the effort of 1,200 employees. He reported that 15 per cent of the stock has been subscribed for by the employees and that 50 per cent of all sales have been for cash with the rest on time payments. The selling of stock locally has been so successful that it is now a part of daily operating routine.

THREE ENGINEER PAPERS

Three papers were presented on engineering subjects—one by William K. Vanderpool, chairman of the overhead systems committee of the N. E. L. A.; another by G. A. Sawin of the Westinghouse Electric & Manufacturing Company, and the third by A. S. Turner of the Edison Lamp Works. Mr. Vanderpool discussed the main features of the committee's work, together with an explanation of the reorganization of the work of the N. E. L. A. technical committees. Mr. Sawin presented a paper entitled "Supplying Service to Farmers in Rural Districts," which took up line construction and the possible revenue for the service. Mr. Turner gave an illustrated talk on industrial and store lighting.

Under the title "The Port of Fair Values," J. Prince Webster presented a masterful discussion on rate of return and valuation from the viewpoints of the courts and public service commissions. He cited many legal decisions that establish fair value on the basis of present reproduction costs.

In an address enthusiastically received, William L. Goodwin of the Society for Electrical Development analyzed the mechandising policies of central-station companies and the trade and pointed out that for industry to expand commercially and in keeping with the engineering side there must be a more liberal application of common sense in the selling of electrical goods to the public with a profit sufficient to call into the trade honest effort and initiative.

In commenting on the sale of securities to the public, Mr. Goodwin expressed the opinion that time will soon see electrical dealers selling the securities of the local utilities over the counter as is done in France. In this connection he urged that the denominations be made small and payment of less than $1 accepted. The answering of such problems, combined with an effort to give the man in the street a better understanding of electrical work by removing many stumbling blocks—such as meter dials hard to read, the diversity of types of attachment plugs and convenience outlets, the varieties of voltages and frequencies and so forth—Mr. Goodwin maintained, will provide the key to the results now being sought in good-will campaigns.

M. R. Bump, president of the N. E. L. A., reviewed the work of the parent body during the past two years and outlined those phases of it which have been thoroughly organized and are now accomplishing practical results. He explained the work of two new committees, one dealing with the customer ownership of securities and the other dealing with the problem of rural business. Mr. Bump announced that the sale of securities to customers during the present year will total around $100,000,000 and said that this activity is one of the most important that the association can foster. He explained that with ability to finance junior securities satisfactorily an important part of the financing problem of utilities will be solved. In working out the needed developments to provide adequate service Mr. Bump urged a united industry, for only through co-operation of each branch of the industry, he said, can large and satisfactory service to the public be accomplished.

RAILROAD ELECTRIFICATION

With reference to the new committee on rural lines and extensions Mr. Bump pointed out that one of the phases of the work will be the making of contracts. A rural charge plus city rates seems to afford a basis for a satisfactory start. A general conference in Chicago will soon be called to discuss this subject. Another development of the future to which Mr. Bump called attention is the electrification of steam railroads. He said that important announcements might be expected in a very short time.

At the closing session the report of the meter committee was presented. This reviewed the measuring of power on three-phase circuits and commented on the problem of taking power factor into consideration and the method of adjusting rates with this in view. H. L. Wills of the Georgia Railway & Power Company, a member of the inductive-interference committee of the N. E. L. A., reviewed its work in a general way.

Charles A. Collier, commercial manager Georgia Railway & Power Company, reported the results of a round-table conference at which time the subject of the organization of a power sales bureau for the Southeastern Section was discussed.

The officers elected for the coming year are as follows: President, D. A. Cheney, Orlando (Fla.) Water & Light Company; first vice-president, F. D. Mahoney, Alabama Power Company; second vice-president, W. R. Sammons, Knoxville Railway & Light Company; third vice-president, Howard Hall, Western Electric Company.

Radio Companies of Four Nations Unite to Improve Service

AN AGREEMENT whereby the four principal wireless companies of the United States, Great Britain, France and Germany will co-operate in the scientific and commercial development of wireless telegraphy throughout the world has been concluded at Paris. Executives of the four companies, who were in session for a fortnight, have announced the agreement in a statement which says: "A comprehensive arrangement which has been made will work for the efficient, economical and immediate dispatch of wireless messages and at the same time prevent the wasteful use of the relatively few wave lengths available for long-distance communication.

"The co-operation of the four companies," continues the statement, "should result in the full utilization of scientific research for the elimination of static and also lead to the fullest development of the radio art, thereby assuring to the public and the press reliable and adequate communication service throughout the world."

N. E. L. A. Committee and Secretary Merrill in Deadlock on Accounting

NO ACTION was taken at the Oct. 17 hearing before the executive secretary of the Federal Power Commission at which the classification of accounts was to have been considered. Secretary Merrill declined to reopen the discussion of the regulations having to do with accounting and depreciation, and the accounting committee of the National Electric Light Association declined to discuss the classification of accounts. As a result the hearing was brought to an abrupt close.

Qualities of Great Executives Analyzed Before Engineering Bodies

IDEALISTS and men with unobstructed vision are the greatest need today in developing large engineering projects. Such was the gist of remarks made by Philip Cabot of White, Weld & Company, Boston bankers, before the first forum of the year, held Wednesday night, of the New York sections of the four national engineering societies. The subject of the forum, "Financing of Large Engineering Projects," drew such an audience that it was impossible for all who wished to attend to gain entrance to the hall.

The other speakers of the evening were A. B. Leach of A. B. Leach & Company, New York bankers and public utility financiers; John H. Delaney, former transit construction commissioner of New York City, and John H. Williams of Day & Zimmermann, Philadelphia engineers. Mr. Leach confined his remarks largely to the financing of the New York City transit companies, making special reference to the proposed change to municipal control.

"Your builder and leader of great industrial enterprises is essentially an idealist," said Mr. Cabot. "He is imaginative, enthusiastic, impulsive, intensely human, a dreamer of dreams with the power to make the dreams come true—in short, an artist capable both of great imaginative conception and fine technical execution, possessed of the power both to conceive and to do.

"A glance at the history of American industry during the last fifty years will show that the great figures are all men of this type—Vanderbilt, Hill, Ripley, Carnegie, Schwab, Gary, Wright, Rosenwald, Woolworth, Armour, McCormick, Cudahy, McElwain, Endicott, Ford, Westinghouse, Coffin and Vail.

"Take Vail, of the telephone company. Distinctly less remarkable than some of his predecessors in intellectual power and scientific training, he took the company when to some of us it seemed about to go upon the financial rocks and left it the most shining success of any public utility in the world, having steered it through the most difficult period for companies of this kind that we have ever known.

"His success was due, not to commanding intelligence, but to imaginative power and the capacity to select and direct men. And look at our dear Henry Ford, with all his sins of ignorance upon his head, who has, as it were overnight, leaped from nowhere into the multi-millionaire class, leading an automobile industry as large in some dimensions as all others in the country put together, and perhaps the only successful one.

"The reason why such men succeed is obvious. They have faith, they believe in things they cannot prove, possess the courage to stake their reputation and their future on their ability to make their dreams come true, and obtain from these qualities the power to inspire with enthusiasm and loyalty the great bodies of men under their command who are their necessary tools, controlling them with the precision and power with which the great painter handles his brush.

"Such a spirit in an organization is an essential—one is tempted to say the one essential—of industrial, as of military, success—unquestioning loyalty and the willingness to take desperate chances at the word of command Leadership in any field demands this type of man, this power to inspire.

"The great builders and leaders of large industries in the United States have all possessed the following qualities: (1) Imagination, giving (a) the power to see with remarkable clearness the customer or the market; (b) power of leadership, the ability to inspire loyalty and enthusiasm in subordinates; (c) judgment of men, the ability to pick subordinates of power. (2) Administrative ability, technique, the power to use tools, to do work through others.

"The qualities are essential because large industries involve the use of large bodies of men who must be led and cannot be driven. They must be always kept growing, which requires vision of the changing conditions of the market. The promotion stage is never over."

Continental Industrial Conditions Quite Similar to Those Here

THE general economic conditions existing in the countries of Europe are virtually the same as those existing in the United States, and of the industries affected by the present depression in business the electrical industry is the most favored, Dr. Walter E. Boveri, of the old-established electrical firm of Brown, Boveri & Company, Baden, Switzerland, told a representative of the ELECTRICAL WORLD last week. Dr. Boveri left Switzerland about a month ago and will probably be in this country for another six weeks or so. His company has important affiliations in many other European countries besides Switzerland, including France, England, Italy, Spain, Germany, Holland and Norway.

"Financial conditions in Switzerland have become considerably easier during the last six months," said Dr. Boveri. "While in the spring money for industrial issues was commanding 7 per cent, it can now be had for 6 per cent. But under present conditions of operation few of the industries are operating to such an extent that they require new money for extensions to plants.

"Of course, the electrification of the Swiss railways is providing a steady market for electrical materials of our own manufacture. The Swiss government made its decision to proceed with its electrification at a time when coal was scarce and very high in price, and a period of thirty years was considered sufficient in which to complete the work. Recently, however, coal has become more plentiful and the price has decreased to such an extent that the efficiencies of electrification do not stand out so prominently at this time, and, although the work is continuing, in all probability it will extend beyond the thirty-year period.

"The St. Gotthard Railroad, which is now operating under electric service, is running on a very light schedule, only two out of the ten generators in the two main power stations being needed to supply the power.

"The industries of Switzerland are running nowhere near up to operating capacity. The lace-making and the watch industries in particular are extremely quiet. Being dependent upon import of raw materials for so much of its manufacturing, Switzerland must find an export market for its manufactured products before it can operate on a capacity approaching normal.

"One of the biggest markets for Swiss electrical materials was in Russia. Of course, the instability of that government does not permit of its purchasing very much equipment except on the basis of cash in gold, and it is thought that a good part of the available gold supply is used up.

"Germany is able to fill its electrical needs from its own manufacturing companies, and Italy, too, is self-supporting. In the last-named country during the war excess profits were put into additional plant buildings, because when used in this way they were not subject to government tax. Now, however, a great part of this plant capacity is idle and 'eating its head off.'

"There is quite a bit of non-employment in Switzerland occasioned by the lack of industrial activity, but it is non-employment of an orderly nature. Labor in the electrical industries is still costing less than labor in England, and this fact was of great assistance to Brown, Boveri & Company in securing a recent contract from the London Town Council for generating equipment. While our company has still work on its books of a hold-over nature, incoming orders at this time are probably not more than enough to operate its plants, scattered throughout the several countries, at an average rate of more than 30 per cent."

Ohio Public Service Issues $5,100,000 in Bonds to Yield 7¾ per Cent

AN ISSUE of $5,100,000 in first mortgage and refunding 7½ per cent gold bonds, due Oct. 1, 1946, and non-callable for ten years, is announced by the Ohio Public Service Company. The price will be 97¼ and interest, which will bring a yield of 7¾ per cent. The bonds will be in denominations of $1,000, $500 and $100, and application will be made to list them on the New York Stock Exchange.

Five Thousand Electric Trucks in New York City

IN AN article appearing in the issue of Oct. 15, entitled "Commercial Electric Trucks in New York City," through a typographical error the figure of 52,128 was given as the number of electric trucks registered in the metropolitan district. This figure indicates the total number of commercial vehicles registered in the New York metropolitan district, of which 5,000 are electric trucks.

Handbook to Be Provided for Electric Vehicle Salesmen

THE electric vehicle salesmen are to be provided with a handbook as a result of action last week by a committee of the Electric Vehicle Bureau of the National Electric Light Association. The pressing need for more specific usable data for these vehicle salesman was discussed at length, and it was established that a practical handbook would aid materially in presenting the qualifications of the electric truck to the manufacturer. A committee was therefore appointed to proceed with the compilation of material and the development of a vehicle handbook to be ready for use before the next convention.

Some New Moves in New Orleans Utility Settlement

ASSERTING that the City Council of New Orleans must accept as the best of a bad bargain the position of a rate-making and regulatory body in order that the negotiations in the controversy between the New Orleans Railway & Light Company and the city may proceed with some degree of hope for a satisfactory settlement, Commissioner of Public Utilities Paul H. Maloney has submitted ten points on which he believes a satisfactory settlement may be based. In these points a base property value of $44,700,000 as of Dec. 31, 1920, with a return of 7½ per cent plus the actual net revenue needed to pay the cost of new money, is included. The company must be reorganized within six months, and the city will select annually one-third of the board of directors, who shall not be city or state officials. All of the directors are to be citizens of New Orleans. The representatives of the city shall have access to the property, books and records of the property. The federal judge who has jurisdiction over the receivership must approve the financial plan of reorganization, and approval must be given by the city and the various other bodies interested.

Common-stock dividends must not be paid until after June 30, 1923, and must at no time exceed 8 per cent per annum. Under this plan the city, in obtaining the control of the utilities for operating purposes, will have an option to purchase this stock at par and accrued dividends. All future stock issues shall be limited to this rate of dividend, and such options in favor of the city as may be agreed on shall be established. The city shall have perpetual purchase options at a price stated as of Dec. 31, 1920. The city shall not be called on to pay for additions or improvements that have been paid for out of revenue received during the receivership. Securities must not be issued without the consent of the city, and the city must also agree to the amounts to be set aside for renewals and replacements. Agreements on new franchises must also be reached. A 7-cent carfare with universal transfers, $1.30 per 1,000 cu.ft. for gas and the present electric service rates for a six months' trial are suggested.

One of the difficulties in the settlement seems to be a conflict between certain groups of bondholders, and as a result the holders of the 4½ per cent bonds of the company are being urged through advertisements in the papers to deposit their securities with a committee that will act to protect their interest, which is understood to be paramount to those of other security holders. It is understood that under the proposed plan of settlement the holders of the 4½ per cent bonds might be called on to relinquish the relative standing of their lien. Mr. Maloney states that fair provision should be arranged for these security holders. He also states that "the holders of outstanding bonds and notes should receive in the aggregate no greater return on their investment than is now payable under existing contracts." The present move is understood to be a sincere effort for the settlement of the difficulties.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest

Pittsburgh Company Reduces Power Rates.—A reduction of approximately 7.5 per cent in the wholesale electric power rates of the Duquesne Light Company, Pittsburgh, has been announced by the company. No other changes in electric rates will be made at present, it says.

"Loud Speakers" to Be Used at Armistice Day Ceremony.—When President Harding delivers the address over the body of the unknown soldier at the Arlington National Cementery at noon on November 11, his voice will be carried by long-distance wires to New York, Chicago and San Francisco. In those cities the address will, through the agency of "loud speakers," be heard clearly by vast audiences similar to the great throng that heard the inaugural address on March 4 in Washington. In addition, amplifiers cleverly hidden in and about the amphitheater at Arlington will, it is said, enable any one within half a mile of the President to hear his words distinctly.

American Company Will Build Wireless Towers in China.—Information received by the State Department at Washington that the Federal Wireless Telegraph Company has signed a supplemental agreement with the Chinese government for the issuance of bonds for radio stations brings to an end an international dispute over the erection of these enterprises under American auspices. The position of the United States is considered to be fully vindicated, the protests made by Great Britain, Japan and Denmark having proved unavailing. Under the contract the company obtained the right to build high-powered stations at Hangkow, Harbin and Pekin. The British, Japanese and Danish governments objected on the ground that the concession was in effect a monopoly.

Tokyo Plans to Convert Rubbish Into Electric Power.—Residents of the western suburban districts of Tokyo recently held a meeting to indorse a plan for establishing two electric power stations at which the rubbish of the section, amounting in weight to 1,000 tons daily, will be used for fuel. The capital to be raised is only $250,000, according to advices from Japan, and 6,000 kw. of electrical energy will be produced per diem at an estimated profit of $194. Construction is to begin immediately. An accumulation of rubbish which has reached the proportions of a nuisance will rapidly be converted into fuel when the power stations are ready. It is reported, as the result of an investigation carried out at Yokahama, that the waste of Japanese towns contains twice the amount of combustible matter contained in the waste of English towns.

Cup Awarded in Radio Speed Contest.—At the recent New York Electrical Show a speed contest for the American open championship in receiving radio code messages was won by B. G. Seutter, transatlantic wireless operator for the New York *Times*, with a record of forty-four and one-third words a minute and no mistakes.

The Trackless Trolley Reaches New York City.—The New York City authorities have opened a trackless trolley line on Staten Island, the southernmost borough of the city. The new cars, according to the city's electrical authorities, possess greater stability than has been attained before with this type of traction. The cars are equipped with greater motive power and with all the safety appliances developed by experience in high-speed traction. The electric power is supplied by two overhead grooved trolley wires. One wire is positive and delivers the current to the cars, while the other is negative, receiving the current passing through the motor and completing the circuit.

Water Power in the Prairie Provinces of Canada.—C. H. Attwood, district chief engineer of the Dominion Water Powers Branch, Winnipeg, Manitoba, estimates, as reported in the *Electrical News* of Toronto, that the undeveloped water power in Manitoba indicates a minimum horsepower of 3,177,049 and a maximum horsepower of 5,234,173. In Saskatchewan the minimum horsepower is 568,761 and the maximum 1,312,071, and in Alberta the figures are respectively 466,134 and 1,114,446. The installed turbine or waterwheel horsepower in all three provinces is 141,465, of which more than 100,000 hp. is developed on the Winnipeg River and transmitted to the city of the same name and to other towns, while 32,000 hp. generated on the Bow River serves Calgary, Alberta, and adjacent places in the Rocky Mountain section.

Important California Rate Hearings.—Hearings to establish a basis for rate adjustments of the principal electric power companies of northern California are scheduled by the State Railroad Commission for the three months beginning Oct. 25. The companies affected are the Pacific Gas & Electric Company, the Great Western Power Company and the San Joaquin Light & Power Corporation. The case of the Pacific Gas & Electric, including the Sierra and San Francisco Power Company, under lease to the Pacific, is set for Oct. 25; the Great Western Power Company's hearing is to begin Nov. 8, and the San Joaquin Light & Power's hearing will be early in December. This is the first time that a complete survey of these companies has been undertaken in order to establish a definite rate base and a reasonable rate of return.

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month.

American Society for Steel Treating.—The Philadelphia Section of this society will meet on Friday of next week.

Industrial Relations Association of America.—This association is scheduled to meet at the Waldorf-Astoria Hotel, New York City, on Nov. 1 to Nov. 5.

Electric Power Club.—The fall meeting of the Electric Power Club will be held at the Hotel Cleveland, Cleveland, on Monday and Tuesday, Nov. 14 and 15, possibly extending into Wednesday.

New York Section, A. I. E. E.—Meeting in joint session with the civil, mining and mechanical engineers' local bodies on Nov. 16, this section of the Institute will discuss the projected Great Lakes-St. Lawrence Canal.

Pacific Coast Section, N. E. L. A.—The Pacific Coast Section of the National Electric Light Association will meet at Del Monte, Cal., Nov. 11 to consider changes in its constitution and particularly a change in its name. As previously reported, the name proposed is Pacific Coast Electrical Association.

Philadelphia A. S. M. E. to Have "Public Utility Night."—On Tuesday next, Oct. 25, the Philadelphia Section of the American Society of Mechanical Engineers will hold a "public utility night" at 8 p.m. in the Engineers' Club, preceded by an informal dinner. William D. B. Ainey, chairman of the Public Service Commission of Pennsylvania, will speak on "The Relation of Public Utilities to the Development of the Community."

Coming Meetings of Electrical and Other Technical Societies

Telephone Pioneers of America—St. Louis, Oct. 24-25.

American Society for Testing Materials—Providence, Oct. 28, 29.

Industrial Relations Association of America—New York, Nov. 1-5.

A. I. and S. E. E., Philadelphia Section—Philadelphia, Nov. 5.

N. E. L. A., Pacific Coast Section—Del Monte, Cal., Nov. 11

Electric Power Club—Cleveland, Nov. 14-15.

A. I. E. E. and Society of Naval Architects and Marine Engineers—New York, Nov. 17.

American Physical Society—Chicago, Nov. 25-26.

Electrical Supply Jobbers' Association—Atlantic Division—Philadelphia, date in November to be fixed. Pacific Division—Del Monte, Cal., Nov. 10-12.

American Institute of Chemical Engineers—Baltimore, Dec. 6-9.

American Physical Society—Toronto, Canada, Dec. 27-31.

American Association for the Advancement of Science—Toronto, Canada, Dec. 27-31.

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities

Repairs to Transmission Line Damaged by Balloon Not an Operating Expense.—An unusual accident to a transmission line was the subject recently of a decision by the Wisconsin Railroad Commission, which found, in valuation proceedings, that the cost of repairing a transmission line short-circuited by an army balloon had been charged to operating expense. The commission held that, if not collected from the government, the expense should be amortized over a period of years.

Standby Plant Excluded from Valuation.—The Wisconsin Railroad Commission in valuation proceedings for the purpose of fixing the rates of an electric utility serving a number of small communities excluded a standby plant maintained by the company on the ground that in any ordinary case of interruption of transmission the necessary repairs to the system could be made in less time than would be required to bring the standby plant, which, moreover, was of inadequate size, into use.

Discontinuance of Service for Non-Payment of Bills.—It is immaterial to the right of an electric service company to discontinue service for non-payment of bills, the Arizona Corporation Commission held in adjudicating a complaint brought against the Arizona Gas & Electric Company, whether the account was presented to the consumer month by month as it accrued or whether, through a clerical error, a bill for the whole amount was presented at one time, although the consumer should have a reasonable time in which to meet the account.

Watered Stock Not a Factor in Rate Fixing.—Dissenting from the refusal of the Maryland Public Service Commission to grant the full amount of increase in gas rates asked by the Consolidated Gas, Electric Light & Power Company of Baltimore, Commissioner Whitman dwelt on the fact that, contrary to the belief of "intelligent and capable business men," the amount of a company's outstanding stocks and bonds receives virtually no consideration in making rates. "The law," the commissioner observed, "says that a utility is entitled to a fair rate of return on a fair valuation of the property. So, practically, the only two things to be determined are, first, the fair value of the property and, second, the fair rate of return, or the percentage of the fair value to which the utility is legally entitled. In 1912 . . . with these two factors determined and the number of thousands of cubic feet of gas and kilowatt-hours produced and sold during a year, the rates for both gas and electricity were established."

Apportionment of Expenses Between Departments.—In passing upon the reasonableness of rates to be charged by the Potomac Electric Power Company after Sept. 1, the Public Utilities Commission of the District of Columbia, dealing with the deficit in street-railway operations, says: "The Washington Railway & Electric Company and the Potomac Electric Power Company are two separate and distinct corporations, furnishing different classes of service to different groups of customers. Even though the companies were combined, there is no justification either in law or in equity that one class of consumers be required to pay a higher rate than the company's service is worth in order that consumers of an entirely distinct class may enjoy a lower rate than they would otherwise have to pay. There are many authorities to support the commission in its opinion that it is unjust and unreasonable to increase the charge to consumers of one commodity in order that the consumers of another commodity may enjoy an otherwise unremunerative rate." The commission therefore refused to allow a restoration of the maximum charge of electric light and power to 10 cents per kilowatt-hour, the rate existing prior to July, 1917."

Effect of Seasonal Business in Service.—Finding that the Cape May Illuminating Company has improved its service, which had previously been pronounced inadequate, the New Jersey Board of Public Utility Commissioners has permitted it to increase its rates for gas materially, observing: "In reaching its conclusion upon this case the board has in mind the urgent insistence of the representatives of the municipalities that their paramount interest is that service should be continued and their agreement that the board might fix whatever rate in its judgment might be necessary for the company to continue to render adequate service. Cape May, which is the principal territory supplied by this company, is a summer resort. The service is, therefore, very largely seasonal. The company, however, must maintain a plant of sufficient capacity to supply the peak demand created by the summer season. For the rest of the year the demand upon the company's service is comparatively small. Nevertheless, the company is required to maintain its plant ready to serve to the full capacity during the winter months with the necessary overhead expenses for those months as if the demand for service continued undiminished. This makes the condition of the company somewhat exceptional and requires, in order that the company shall continue to maintain service, that it be accorded a rate higher than would be necessary in territory not affected by seasonal variations."

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies

Missouri Commission Upheld in Its Rate-Fixing Methods.—In State ex rel. Southwestern Bell Telephone Company vs. Public Service Commission, the Supreme Court of Missouri has upheld the commission order fixing rates. Such an order, the court says, may be questioned on the ground that the rates are so low as to be confiscatory, that they were fixed arbitrarily without regard to the evidence, or that they were fixed in such an unreasonable manner as to cause the shadow and not the substance to determine the conclusions. None of these conditions existed. Where the commission gave primary consideration to the original cost of the plant, the estimates of the company's engineers of the cost of reproduction, the depreciation and working capital, and also considered the items of engineering, supervision, interest during construction, insurance and promotion and development expenses, and, moreover, reached the same result by taking the book value of the property, deducting property not used, working capital and depreciation reserve and adding 10 per cent for intangibles, it followed a proper rule. (233 S. W. 425.)*

Failure to Serve in Its Relation to Competition.—The Pennsylvania Power & Light Company, incorporated in 1913 by the consolidation of thirty-eight small electric companies, had up to Nov. 12, 1917, made no effort to comply with its charter obligations in the township of Macungle, according to the finding of the Supreme Court of Pennsylvania in a suit brought against the company named above by the Fogelsville & Trexlertown Electric Company, which was organized to supply electricity in Macungle because of the failure of the Pennsylvania Power & Light Company to do so. The plaintiff obtained an injunction from the lower court ordering the defendant to remove the pole line which it had built after the organization of the plaintiff company. The Supreme Court, holding that the case was one which should have been brought before the Public Service Commission and settled there in accordance with the policy of the Commonwealth to restrain competition between public service companies, modified the injunction so as to preserve the *status quo* for thirty days, during which time appellee could apply to the commission for an order that would further preserve the *status quo* until final determination. (114 At. 822.)

* The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel—Responsibilities and Association Appointments of Men Engaged in Professional, Executive, Operating and Commercial Branches of the Industry

Harry E. Duren has been appointed manager of the Greenfield (Mass.) Electric Light & Power Company and assumes his new duties about Oct. 1. Mr. Duren was born in 1880 at Fairfield, Me., and was graduated in 1902 from the University of Maine, electrical engineering course. He then went to the Schenectady works of the General Electric Company, taking the student course in the testing department and serving three years at this plant. For two years he was in the engineering department of the company's office at San Francisco, and from 1910 to 1913 he lived in the Pacific Northwest, being occupied in electrical engineering work at Portland and Seattle. In 1913 Mr. Duren returned East, and he has since been employed by various public utilities on special power engineering work. He acted as power engineer for the Turners Falls (Mass.) Power & Electric Company from 1917 to 1919, and for the past two years he has been associated with the Fall River (Mass.) Electric Light Company as a power engineer.

H. E. DUREN

James M. Wakeman, formerly general manager of the Society for Electrical Development, Inc., is at present in England on a visit. Just before sailing from New York the New York Electrical League, of which he was at one time chairman, presented Mr. Wakeman with a gold fountain pen. A host of friends also crowded his stateroom with fruit, flowers and other remembrances at the time of his departure. Mr. Wakeman expects to spend about six months in touring the British Isles, France and Switzerland with Mrs. Wakeman.

Sir Adam Beck, chairman Ontario Hydro-Electric Commission, is receiving the condolences of his friends over the death of his wife last Monday.

Thomas Henry Day, executive secretary of the National Association of Electrical Inspectors, is seriously ill at his home at 59 Deerfield Avenue, Hartford, Conn. Mr. Day had hoped to celebrate his forty-fifth anniversary in the electrical field this month at a meeting of the association. Owing to his illness, however, the meeting will not be held. Mr. Day began his electrical career Oct. 10, 1876, his first task being to install a thermostatic fire alarm in the bunkers of the battleship Tennessee.

Admiral John Keeler Robison, whose appointment as engineer-in-chief of the navy has been confirmed by the Senate, has entered upon his new duties. Admiral Robison was born in Ann Arbor, Mich., Nov. 30, 1870. His early education was obtained in the public schools of Detroit. He was graduated from the United States Naval Academy in 1891, but continued his studies in Paris at the Ecole d'Application du Génie Maritime, where he was graduated in 1894. He attained the rank of past assistant engineer in 1897 and in 1899 was transferred to the line, where he passed through the successive grades, attaining his captaincy in 1916. Admiral Robison probably is best known for his work in organizing the post-graduate school in engineering at Annapolis.

J. K. ROBISON

Throughout his career he has specialized in the study of boilers. He has been an important factor for a number of years in determining the navy's policy regarding their use. It was he who started an information service for naval engineers which grew into publication of the manuals that guide the operation and maintenance of engineering plants aboard ships. He is the author of the navy's first boiler manual.

Carl D. Jackson, who was elected president of the National Association of Railway and Utility Commissioners at Atlanta, Ga., Oct. 12, has been chairman of the Wisconsin Railroad Commission since 1916 and has for an equal time been active in the affairs of the national association. In 1919 he was elected second vice-president and in 1920 first vice-president. He has served on numerous committees, and as chairman of the committee on state and federal legislation in 1920 he did much noteworthy work. During the past year he has served as chairman of the executive committee. Mr. Jackson was born at Evanston, Ill., in 1870 and was graduated from Harvard in 1894. Following graduation he practiced law continuously in Wisconsin until his election to the commission in February, 1915. From 1900 to 1906 he was District Attorney of Winnebago County. Although the Railroad Commission of Wisconsin is not so old as some of the other commissions, having been organized in 1905, it has done much original work under the chairmanship of Mr. Jackson and Halford Erickson, whom he succeeded. This work has been widely studied and followed in many details by other commissions. In railroad affairs the commission's study of the costs of railway movements was the first made in this country. In the public utility field similar studies have been made, notably on rates and forms of schedules. One of the special features of the Wisconsin form of regulation is the indeterminate permit, which does away with the indeterminate franchise. From the start the commission has had regulatory jurisdiction over municipal unilities as well as those privately owned, and this has not only met the approval of the municipalities but has been of decided assistance to them in the operation of their systems and the development of their service.

C. D. JACKSON

Senator Frederic Nicholls, chairman of the board of the Canadian General Electric Company, recently underwent a serious operation at the Toronto General Hospital. Although his many friends have hopes of his early recovery, his condition has not yet shown any large degree of improvement.

E. L. Callahan has been appointed sales manager of the Westinghouse Lamp Company, succeeding Elliot Reid, who has resigned. Mr. Callahan has represented the company as district manager in its Chicago office for six and

E. L. CALLAHAN

one-half years, prior to which time for six years he directed the activities of the new-business department of H. M. Byllesby & Company, Chicago. Mr. Callahan was graduated from the Case School of Applied Science in 1900. Immediately on leaving college he received a commission in the War Department as electrical expert and was assigned to work in connection with a proposed submarine cable from Nome to St. Michael's, Alaska. His later experience was with the Westinghouse, Church, Kerr Company, assisting in the preliminary work on the electrification of the Pennsylvania Railroad terminals in and near New York. After this he entered the appliance branch of the industry as assistant manager of the Simplex Heating Company of Boston, later becoming manager of the heating department of the General Electric Company at Chicago. His activities in the industry were such that he was made chairman of the Commercial Section of the National Electric Light Association, he having been one of the founders of the section.

C. R. Alden has been appointed to the professorship in electrical engineering and the deanship of the College of Engineering at the Ohio Northern University, Ada, Ohio. Mr. Alden was formerly director of the School of Engineering, Detroit Institute of Technology. He is an associate member of the A. I. E. E., a member of the Society for Promotion of Engineering Education, and during the war period was lieutenant instructor in the naval school of steam engineering at the Stevens Institute of Technology, Hoboken, N. J.

T. B. Pierce, formerly president of the Kentucky & West Virginia Engineering & Electric Company, is now president and general manager of the Central Electric Company, Huntington, W. Va.

Ralph R. Rugheimer has been appointed representative of the Automatic Reclosing Circuit Breaker Company of Columbus, Ohio, in charge of the eastern Kentucky, Virginia and southeastern Ohio territory.

Marcus A. Curran, former manager of the Omaha (Neb.) district of the Western Electric Company, is now in charge of the Cincinnati (Ohio) office. He succeeds William H. Quirk, who has been transferred to the Chicago office in charge of the telephone department.

R. A. Stinson, vice-president of the Canadian Crocker-Wheeler Company, Ltd., St. Catharines, Ontario, has been made president and general manager of the English Electric Company of Canada, which has acquired control of the Canadian Crocker-Wheeler Company.

F. W. Price, who for several years has been associated with the Apex Electrical Distributing Company, Cleveland, as Southern district manager, has been promoted to the rank of Eastern district manager, taking in the territory of metropolitan New York, eastern Pennsylvania, New Jersey, Maryland, West Virginia and Virginia. R. H. Short, who has been associated with Mr. Price as assistant Southern district manager, is now in charge of the entire Southern district.

Obituary

Col. Spencer Borden, who in the early days had the New England agency for selling Edison electric lighting plants, died on Oct. 17, at the age of seventy-two.

William D. Kohlwey of the Kohlwey-Smith Electrical Company, San Francisco, died in that city on Sept. 25. He was one of the leading contractor-dealers in the state.

Dr. Joseph William Richards, professor of metallurgy at Lehigh University and secretary since 1907 of the American Electrochemical Society, died at his home in Bethlehem, Pa., on Oct. 12, at the age of fifty-seven. Dr. Richards was one of the founders of the American Electrochemical Society nearly twenty years ago and was its first president. He was also one of the founders of *Electrochemical Industry*, the forerunner of *Chemical and Metallurgical Engineering*, published by the McGraw-Hill Company, and during its early years was president of the Electrochemical Publishing Company, which issued the periodical first named. Dr. Richards was essentially a chemist and metallurgist and a teacher of wide influence.

Prof. Alexander Gray, director of the School of Electrical Engineering, Cornell University, died on Oct. 13, after a prolonged illness. Professor Gray went to Cornell from McGill University, Montreal, in 1915. He was born in Edinburgh of a well-known family of engineers. As a boy of fifteen he was apprenticed and worked for seven years at the lathe, bench and drafting board, during which time he attended evening classes and later engineering classes at

ALEXANDER GRAY

Edinburgh University. He was graduated from that institution in 1903 in civil and mechanical engineering. Subsequently the Whitworth scholarship, which enabled him to spend two years in the study of electrical engineering at McGill University, was awarded to him. He joined the engineering staff of the Bullock Electric Company, where he was head of the alternating-current motor department, and continued with the Allis-Chalmers Company after the merger. During the five years that he was thus occupied he attained a wide experience in the design, construction and operation of all types of electrical machinery. He went to McGill in 1910 as an assistant professor. A number of patents for electrical apparatus were granted to him, and he also contributed largely to the literature of the industry. His two books, "Electrical Machine Design" and "Principles and Practice of Electrical Engineering," have been widely adopted as university textbooks.

Douglas B. Bronson, superintendent of shops of the Commonwealth Edison Company, died on Sept. 24. Mr. Bronson was one of the group of men composing the original employees of the old Chicago Edison Company, which was started in 1887. In June of that year he entered the service of Leonard & Izard, who did the construction work for the company. The following spring the Chicago Edison Company formed its own construction department, and Mr. Bronson was one of the first foremen appointed. He became superintendent of shops in 1900.

Trade and Market Conditions

Business Reviews, Together with Market Letters from Important Trade Centers, on the Supply, Demand and Prevailing Prices of Electrical Apparatus and Supplies

Hand-to-Mouth Buying Giving Way to Near Future Purchases

THROUGHOUT the month of October and also during the latter part of September there has been a noticeably better feling in the jobbing trade and noticeably better buying on the part of dealers and contractors. Virtually all sections of the country are now reporting a gradual liquidation of the high stocks of wiring devices and supplies held both by the contractor and dealer trade and the jobbing trade and a more even degree of ordering. The hand-to-mouth buying of the past ten months seems to be giving way to a carefully laid-out system of purchasing for a moderate period in advance, the result of a gradually improved condition in business in general.

Then, too, the volume of building is on an increase, and there is undoubtedly foreseen a better demand for wiring materials. At least, up to date the increase in buying appears to be more along this line than along any other. With lower prices in rubber-covered wire, weatherproof wire and many items of schedule material, trade in these goods has picked up. In the line of heating devices, air heaters have picked up well in fall demand and sales are on a pretty fair basis. Jobbers have now had to go back to manufacturers to replenish stock moved by the dealers. This is as was expected, because many jobbers signified their intention of waiting for a market to develop before making demands on manufacturers' stocks. This may not be fulfilling the whole function of a jobber, but it is the method frequently used this year.

As an encouragement to the industrial company contemplating new wiring, prices are reduced considerably. Several contractors in the New York City territory in refiguring bids for motor installations and necessary wiring find their proposals in the nature of 20 to 30 per cent below those submitted the first of this year

Switch Exports in 1920 Exceeded Those of 1919 by 20 per Cent

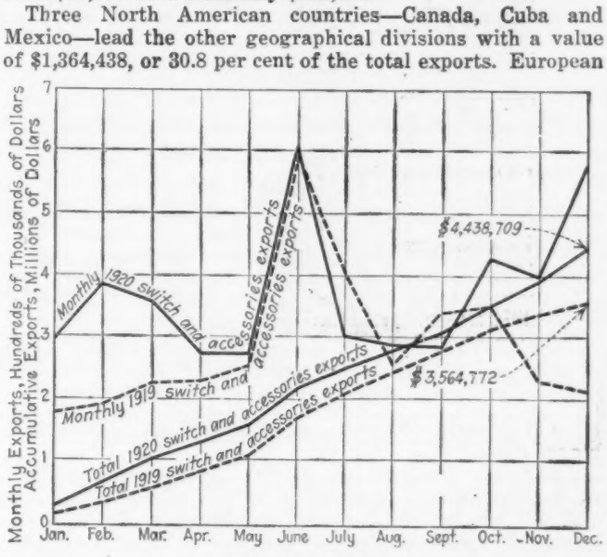
EXPORTS of switches and accessories from the United States during the year 1920 stood sixth in order of value of all exports for that year and amounted to $4,438,709. This is an increase of nearly 20 per cent over the value exported in 1919, in amount $3,564,772. It is virtually one-third of the value of motors exported in 1920. Exports by the month taken over the last two years showed few parallels, the outstanding feature being the high peaks registered in the month of July of each year.

In this item too Canada stands at the top of the list, with imports valued at $964,059. Belgium is not far behind, with $775,461. The countries next in order are separated by a wide margin from these two, but fall away in an easy curve one by one. Those countries taking over $25,000 in switches and accessories are shown in the attached table, and the total of the twenty-five so listed amounts to $4,249,034, nearly 96 per cent of total exports. The fifty-three remaining countries taking switches in amounts less than $25,000 each total only $189,675.

EXPORTS OF SWITCHES AND ACCESSORIES IN 1920

Canada	$964,059	Dutch East Indies	$83,273
Belgium	775,461	France	79,112
Cuba	270,957	Philippine Islands	75,064
China	264,462	Switzerland	66,403
Japan	249,357	Hong Kong	42,582
Brazil	207,275	Netherlands	40,526
England	156,741	Chile	36,977
Australia	153,493	Panama	35,916
Argentina	134,890	Italy	32,588
Mexico	129,322	Peru	31,630
Spain	127,084	Uruguay	29,702
New Zealand	91,572	Fifty-three other countries importing switches and accessories	189,675
British India	86,823		
Norway	83,765		
Total			$4,438,709

Three North American countries—Canada, Cuba and Mexico—lead the other geographical divisions with a value of $1,364,438, or 30.8 per cent of the total exports. European


Monthly Exports, Hundreds of Thousands of Dollars
Accumulative Exports, Millions of Dollars
Monthly 1920 switch and accessories exports
Monthly 1919 switch and accessories exports
Total 1920 switch and accessories exports
Total 1919 switch and accessories exports
$4,438,709
$3,564,772
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

PEAK OF BUYING IN BOTH YEARS HAS BEEN IN MONTH OF JUNE

states are a close second, with 30.7 per cent, but it took eight states to make up this amount. Four countries in Asia accounted for 14.5 per cent of the total, imports to China and Japan being almost the same. Five South American states contributed 9.9 per cent, and the islands southeast of Asia took 9.1 per cent of all the switch exports.

This compilation was made by the ELECTRICAL WORLD from figures received from the Bureau of Foreign and Domestic Commerce.

Active Demand for the Medium to Higher Priced Lighting Fixtures

FIXTURE manufacturers and dealers are finding that the better grade of lighting fixtures have a more ready sale than those of lower price.. There has been considerable building of apartment houses and homes in and around New York which has created a fairly good market for residential fixtures. However, most dealers have fairly large stocks on hand and competition is keen. The demand for the moderately priced to cheaper grades of fixtures does not appear so good. One reason for this is the fact that few apartments for low rental have been built. There are also a large number of small manufacturers whose prices on this class of equipment are much below what would be a profitable price for the larger manufacturer. Price competition is much worse in the latter class.

Commercial unit types of fixtures are having a fair sale in business buildings. These are not only being installed in new establishments but in many instances old-type fixtures are being replaced. The educational campaigns for better lighting are producing results in the inquiries

which have been received from commercial and business houses. Industrial lighting fixtures are also moving fairly well, but the demand is not so strong as for the commercial type.

Stocks of nearly all types are good and manufacturers are making immediate shipments from factory stock frequently phenomenally quick.

Some Comparisons Between American and German Motor Prices

FIGURES have recently been received from what has been ascertained to be an authoritative source giving prices of German-made electric motors calculated for export, including expenses of export and of packing, f.o.b. German port, except duty. This authority finds from experience, however, that, although interestingly low, the prices are believed to be based upon higher exchange rates than exist at present and are subject to alteration when an actual bona-fide purchaser attempts to place an order. The home office frequently refuses to confirm the order except at a higher rate.

AMERICAN AND GERMAN MOTOR PRICES

	German		American	
Hp.	R.p.M.	Price in Marks	R.p.M.	Price
Three-phase, squirrel-cage, 220-volt:				
1	1,400	1,650	1,800	$59.40
5	1,400	3,500	1,800	103.50
5	925	4,200	900	144.90
Three-phase, slip-ring, 220-volt:				
5	1,400	4,500	1,800	$180.00
10	1,400	6,800	1,800	270.00
50	1,400	22,500	1,800	628.00
Direct-current, 220-volt, shunt-wound:				
5	1,100	5,300	1,100	$217.00
7.5	1,800	5,300	1,800	200.00
15	1,650	7,400	1,700	297.00

The motor trade in the United States probably fears little from German competition in this country, but must certainly run against it when considering the South American field. Experience in that field has established frequent examples of refusal to confirm agents' offers when these were sent as orders to the manufacturer of equipment in Germany.

A comparative table is presented herewith giving the German prices and representative American prices for motors as near similar as possible. The German motors are quoted as new with a one-year guarantee. No heating specifications are given. All quotations are given without pulley, base and starter. The mark on Oct. 18 was quoted at 0.60 cents.

More Co-operation Needed Between Sales and Credit Departments

AS A MEANS toward better credit conditions in the electrical jobbing and manufacturing field it has been brought forth that a closer co-operation between the salesmen, the sales manager and the credit manager would put the credit situation on a higher plane. This is particularly true, it seems, on new accounts.

There is always a certain amount of satisfaction in making a new sale and gaining a new account, which is frequently the only aim of the salesman. This would seem to apply more particularly in the case of the jobber's salesmen. The salesman is frequently the only point of contact between dealer or contractor and the jobbing house, and he would seem to be the logical man to establish a credit rating for his new customer. If the salesman felt that he was personally responsible financially for the credit of each new account, he would undoubtedly be more careful in opening these new accounts than he otherwise would be by putting the financial responsibility up to the jobbing house. The credit manager of the jobbing house pulls down his Dun or Bradstreet, and if the customer in question has a clear rating there he is generally passed as "O. K." In many cases that have come to notice a strict financial risk has been taken on in some of the accounts so listed.

Why cannot the salesman when he is making new connections for his house quietly sit down with the new customer and get from him his banking connections, the names of some persons with whom he does business, etc.? A check-up with other possible companies doing business with this customer would make this credit check much more complete.

In the district covered by the New York division of the National Electrical Credit Association the number of accounts reported to that body has increased considerably since the middle of this year, and the total of reported accounts has also increased. There have been more accounts for small amounts reported in the last four months. The total to date is well above that covering the same period in 1920.

The whole question of credit is a serious one at this time, and the increasing number of small amounts is probably due in some part to the lower prices of materials and to new customers coming back into the market and being accepted with too little credit establishment. Greater activity in this connection on the part of the jobbers' salesmen would probably accomplish much in overcoming this condition

Metal Market Situation

AFTER several weeks of activity the copper market has once more quieted down. Many of the large consumers have withdrawn from the market temporarily and it has been possible to supply the light current demand with copper at 12⅞ to 13 cents delivered. Large producers, however, will not quote under 13 cents. The situation may have been influenced by heavy liquidation in London, where spot declined £3 13s. to £65 15s.

Advices from the Intermountain regions show that stronger prices may continue throughout the year in response to a moderate improvement of export demand and a seasonable increase in consumption of the metal. As a usual thing there is a good deal of buying in November and December for spring delivery to manufacturers. Another encouraging factor is the consumption of the excess supply of copper at the rate of 40,000,000 lb. per month, instead of 25,000,000 lb. as had been expected when the mines were closed down early last April.

The British government has announced the sale of its stock of brass scrap, totaling, it is said, about 150,000 tons. To this transaction is attributed the break in the London copper market. It is felt in some quarters that a good portion of this brass may reach this country. Exports to date this month have been good. A price of 13 cents f.a.s. prevails.

Possibility f lowered freight rates may account for lack of buying for December shipment. Prospect of a rail tie-up has affected buying little, as a strike would prevent movement of copper products as well as copper.

NEW YORK METAL MARKET PRICES

	Oct. 11, 1921	Oct. 18, 1921
Copper	£ s d	£ s d
London, standard spot	69 7 6	65 15 0
	Cents per Pound	Cents per Pound
Prime Lake	13.00 — 13.25	13.00
Electrolytic	13.00	13.00
Casting	12.62½	12.37½
Wire base	14.50	14.50
Lead, Am. S. & R. Co. price	4.70	4.70
Antimony	5.00	4.90
Nickel, ingot	41.00	41.00
Sheet zinc, f. o. b. smelter	10.00	10.00
Zinc, spot	5.12½	5.15—5.20
Tin, Straits	27.25	28.00
Aluminum, 98 to 99 per cent	24.50	24.50

OLD METALS

	Cents per Pound	Cents per Pound
Heavy copper and wire	10.00 —10.75	10.50 —10.87½
Brass, heavy	4.75 — 5.25	5.00 — 5.50
Brass, light	4.50 — 4.75	4.50 — 5.00
Lead, heavy	3.50 — 3.87½	3.50 — 4.00
Zinc, old scrap	2.25 — 2.37½	2.25 — 2.37½

THE WEEK
IN TRADE

Prices When Quoted Are Those Prevailing at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for all Eastern Points

CONTINUED improvement in virtually all sections of the country is the dominant note not only of the electrical industry but of general business conditions. Wire is, of course, leading in business booked, but there also has sprung up a heavy demand for all sorts of small heating appliances. A Chicago jobber this week reports a shortage of flatirons and curling irons, and sales of air heaters have improved there also. The beginning of the rainy season is pushing sales of heating appliances on the Pacific Coast.

Sales of storage batteries for road trucks are reported improving in New England. Retail sales are picking up in Boston, New York, St. Louis and in the Far West, and this buying is reacting immediately on jobbers and manufacturers.

The construction outlook has improved in Chicago, while the number of building permits granted in San Francisco and Los Angeles indicates a building boom in that section. Atlanta reports better collections in September than for any month since February, and St. Louis lists improvement in the Southwest. Collections in Boston are on a sixty-day basis. Chicago jobbers report some improvement.

NEW YORK

Conditions in the electrical trade continue gradually to improve, and jobbers generally report an increasing volume of business. Buying is still more or less of the hand-to-mouth nature, contractors purchasing their wiring supplies as the work in hand requires. Orders, however, are coming in to the jobbers more often and stocks are moving much better. The fact that several jobbers have found it necessary to increase their clerical force to take care of the increase in the number of orders is a good indication of the trend of business. Prices remain unchanged since last week, although there is some buying of rubber-covered wire and armored conductor because of the increased quotations on basic materials.

An active demand is reported for single-unit commercial and industrial fixtures. Salesmen working on this class of business have developed a considerable market through replacing old types of fixtures in commercial and business buildings. Of the two types, the commercial lighting unit is more in demand. Air heaters have moved well during the past week, and jobbers who carried stocks over from last year are well satisfied with the results. Other heating appliances show more activity than heretofore, and some orders for the holiday trade have appeared.

Collections appear to be improving slightly, jobbers reporting current credit sales on a thirty to sixty-day basis.

Conduit.—Orders continue to be for moderate quantities with the demand steady, but there seems to be no inclination on the part of contractors to lay in stocks. Prices quoted this week were as follows: For ½-in. black pipe in 2,500-ft. lots, $54 to $55; ¾-in., $69 to $71, and 1-in., $99 to $101. Galvanized pipe in the same sizes was quoted at $59 to $62, $76 to $81 and $110 to $116. Jobbers' stocks are fair to good in most sizes.

Flexible Armored Conductor.—Demand for this material continues strong. In addition to the sales to contractors for their immediate requirements there is considerable buying based on the belief that armored conductor will command a higher price in the near future. No price changes were reported this week. No. 14, two-wire, single-strip, is quoted at $43 per 1,000 ft., and double-strip at $44.50 per 1,000 ft., in lots of that quantity. Jobbers have fair stocks.

Rubber-Covered Wire.—Demand is moderate and orders for small quantities, although prices are stiffening and an advance is looked for. In lots of 5,000 ft. No. 14 rubber-covered is quoted at $6.35 to $6.60 per 1,000 ft. Stocks generally are good to large.

Lamp Cord.—Sales are a little better and silk cord is in demand for holiday business. Prices remain as last quoted, No. 18 cotton, twisted, selling for $12.30 per 1,000 ft. and No. 18 parallel at $14.90 per 1,000 ft.

Heating Appliances.—Buying is better than heretofore, and the appliances other than flatirons and toasters are beginning to move. There is still a shortage of some makes of flatirons, toasters and curling irons, although jobbers' stocks of other items are fair to good. Some orders for grills, percolators, stoves and similar appliances for holiday business have appeared.

Loom.—The demand is small and jobbers' stocks are limited. In 1,000-ft. lots the $\frac{7}{32}$-in. size sells for $19.25 and the ¼-in. size for $21 per 1,000 ft.

Heaters.—The cool weather has stimulated the sale of heaters and jobbers report an active demand. The carry-over from last year has been partially disposed of and stocks are moderate.

CHICAGO

Coincident with the strengthening of copper prices, jobbers here report much better sales of weatherproof and rubber-covered wire and flexible armored conductor. This has changed the tone of jobbing opinion to one of mild optimism. Another indication of at least fair business during the pre-holiday months is seen in the activity of small heating appliances, such as flatirons, curling irons and air heaters. One large jobber already has reported some shortage of flatirons and curling irons. An improvement in collections during the week is reported, a few jobbers having got them down to a forty-day basis on current sales.

The labor situation has changed little during the week, and there is confidence that the factors concerned will reach a fair settlement before very long. Building permits continue to gain over last year, those for the week ended Oct. 13 showing an increase of 129 over the similar period in 1920, with a listed value $1,656,800 greater.

Chicago utilities are in a very good position as far as their coal supply is concerned, and the threatened railroad strike is not causing much worry on that score. The Commonwealth Edison Company has a thirty-day to thirty-five-day reserve, while that of the Public Service Company of Northern Illinois is even better.

Wire.—The bare-wire base this week ranges from 15 to 16 cents, showing a strengthened market. Weatherproof prices also are ranging from 15 to 16 cents per pound in 1,000-lb. lots. The demand for No. 14 rubber-covered wire is strong, and it is quoted at a price varying from $6.50 to $6.75 per 1,000-ft. in 5,000-ft. lots. Jobbers report their stocks ample.

Rigid Conduit.—Quotations continue on about the same basis as last week. Jobbers report demand fair and stocks good in all sizes. The following are representative prices: ¾-in. black pipe in 2,500-ft. lots, $48 to $50 per 1,000 ft.; ½-in galvanized, $51 to $53.

Flexible Armored Conductor.—Prices have stiffened, and No. 14 two-wire, single-strip, is quoted from $50 to $52.50 per 1,000 ft. in 5,000-ft. lots. Movement is good, and stocks are easily sufficient to handle the demand.

Dry Cells.—Little has developed recently on this item, movement being slow but comparatively steady. Stocks are about normal. The standard cell is quoted at $30.65 per 100 in barrel lots.

Lamp Cord.—No. 18 cotton twisted is quoted at $15 per 1,000 ft. Demand continues steady and jobbers' supplies are easy.

Tape.—Prices on this item are holding exceptionally well, owing probably to the recent flurries of the cotton market. There has been little increase in activity.

Heating Appliances.—Flatirons and curling irons still lead heating devices in number of sales although the demand for percolators, toasters and grills has increased noticeably during the last few weeks. Air-heater sales have been very good with prices varying from $10 to $11 per unit.

High-Tension Equipment.—The demand for this material is increasing constantly and local manufacturers report good production.

BOSTON

Trade is gradually picking up in most lines, and distributers are feeling more hopeful as the diversification of orders is broadened. No large buying movement to replenish stocks lowered by months of liquidation is yet apparent, but demands upon manufacturers are increasing, and this is not all due to seasonal activity. Collections are reported better, and some houses are working on a sixty-day basis. Prices held stable in most lines last week, barring weakness in some large commitments due to close competition. Betterment work in industrial plants is showing a little more life, and central-stations are intensively cultivating loads within reach of their present systems, with occasional ventures into the extension field. Building operations are absorbing considerable material, and suburban residence construction is very active in some districts. There is a general disposition to discount the adverse effects of a railroad strike, sentiment in New England being strongly against a walkout.

Motors.—Inquiries are improving decidedly, and sales reflect better conditions. The last six weeks have shown a much healthier tone, although the demand is still too light to put much pressure on producers. Motors of 50-hp. rating and below are in chief demand, though occasional sales of larger units are now taking place.

Radio Apparatus.—Since midsummer business has been very active. September was the best month a leading manufacturer in this district ever had, sales being maintained equally well this month. Prices are 10 to 15 per cent lower than in the early fall on representative products.

Wire.—Moderate sales continue, and prices reflect close competition. No. 14 rubber-covered sold at $6.25 per 1,000 ft. in 5,000-ft. lots Monday, and prices were quoted at $6 f.o.b. factory on 25,000-ft. lots, per 1,000 ft. Labor difficulties, which held up production in one district, are reported to be over. Weatherproof is moving slowly, base price being 15½ cents.

Storage Batteries.—Sales for road-truck service, notably for Rhode Island bakery and ice-cream delivery use, are improving perceptibly. Industrial truck batteries are quiet, and it is reported that about fifty industrial trucks have been sold in New England this year.

Porcelain.—"Nail-It" knobs are moving better, barrel-lot price being $18.50 per 1,000. Tubes are also in better demand, and the 3-in. x ½-in. tube sells for about $6.20 per 1,000 in barrel lots. Stocks are satisfactory.

Flexible Armored Conductor.—No. 14 single strip sells for $44.68 to $45 per 1,000 ft. in 5,000-ft. lots. Demand is fairly good, and stocks are easily meeting it.

Loom.—Prices continue weak, notwithstanding the increased cost of cotton. The ⅞-in. size is quoted around $16.50 per 1,000 ft. in 5,000-ft. lots.

Appliances.—Washers and cleaners are a little more active, and socket devices for table use are showing better movement. Stocking for fall trade is slow to materialize, but it is expected that more active movement will be noticeable in the next few weeks.

ATLANTA

Though there is little marked change to be reported in the section for the week, a continued general betterment in business conditions is in evidence. Building permits in Atlanta for the first week in October exceeded $250,000 in value, while bank clearings were more than $5,000,000 in excess of the prior week and the largest for any week since January. Postal receipts are reported very largely increasing, the heaviest day in this city's history being recorded last week. The larger contracting firms, whose business has been somewhat dull for a considerable period, report a reawakening in the activity in the industrial field which has resulted in a large number of inquiries being received by jobbing firms for quotations on materials entering into construction for this class. The smaller contracting business continues to show a well-maintained volume, and purchase of line material by central-station companies is increasing quite satisfactorily. A general survey of the situation seems to indicate that the last four weeks have witnessed an increase of 25 per cent in the volume of bona-fide business. Money realized from crops is beginning to be in evidence, and all wholesale lines report their collections for September as having been the best for six months past.

Flexible Armored Conductor.—Low and somewhat unstable quotations on this article have materially stimulated sales. Stocks are ample with the price of No. 14, two-wire, at $55 per 1,000 ft. in 1,000-ft. lots.

Stamped-Steel Boxes and Covers.—Considerable activity is to be noted, one order alone this week amounting to 14,000 boxes, the largest single order since 1914. There have been no changes in prices in the past four weeks. Stocks are ample in all standard sizes.

Rigid Conduit.—Sales are holding up satisfactorily, especially in the ½-in. size, in which there existed a temporary shortage, but which was relieved this week by prompt factory shipments. The black seems at present to have a shade the better popularity. No recent price changes are reported, but there has been some price cutting in the slower-moving sizes.

Printing-Press Equipment.—This line has again become active, especially in motor sizes of 7½ hp. and under. Sales of the three-phase type amount to approximately 90 per cent of the business, most of the single-phase type going to the Florida territory. Stocks of alternating type are in fairly good shape, while local stocks of the direct-current class are being steadily reduced to absolute minimum because of a general slackening in the demand.

Oil-Engine Generating Sets.—Manufacturers report a number of recent sales in this line for sets of 100 kw. and over, this apparatus going to municipalities in southern Alabama, Florida and Georgia. Shipments are on a thirty-day basis and prices are steady. A number of inquiries are still in hand awaiting final action.

Air Heaters.—The recent cold snap has caused a brisk movement in the retail field of this line, one dealer alone having disposed of 200 in this city in the last few days. Jobbers' stocks are heavy, and there is little likelihood of their reordering in the near future.

Industrial Motors.—Sales are becoming quite active. The larger power companies' requirements for power-factor correction are causing an increased movement in the synchronous types, mostly in the 550-volt and 2,300-volt, three-phase variety.

Portables.—Fall shipments for holiday stocks are beginning to be received, and retailers expect an excellent holiday season in this line, which is stimulated by price reductions of from 50 per cent to 75 per cent under prices of last year. Sales to date are confined mostly to the larger cities.

ST. LOUIS

Dealers and contractors until recently made purchases in only very moderate amounts and maintained stocks at levels much lower than would be the case normally for the volume of business prevailing, but now, with stocks depleted and with confidence somewhat restored, they are placing orders for larger quantities and are building up their stocks to a more normal basis. This feature of the market accounts to a large extent for the gradual improvement in jobbers' business, which continued to show advancement last week. To no class of goods is especial favoritism being shown.

The same effect is noticed in business generally in this territory, and as a result industrial plants are becoming more active. During the week one of the largest steel mills in the district resumed operations after a four-month

shutdown and a large glass plant, which had been closed since about the first of the year, started its furnace fires. The shoe factories are running at about 80 per cent of capacity and the two tire factories here at full capacity. The metal industries have increased production somewhat, but their business is still very quiet.

Credit conditions show little change, the average basis of collections remaining at about sixty days. The long-outstanding accounts are being slowly liquidated and new obligations are being quite promptly met. Some improvement in the South is observed, but because of the vast amount of indebtedness in that section it will be a considerable time before credit conditions there can approach normal.

Heaters.—The principal activity this week was in this line. Some of the jobbers' stocks have been exhausted, and orders are being placed with the manufacturers. The dealers are playing closely and are buying only for short-term requirements.

Flatirons.—Excellent movement is reported, one jobber having no stock and a large amount of back orders. Of the heating appliances, flatirons are by far the best sellers this season.

Ranges.—Movement is very quiet, though some improvement is found in Kansas and Missouri owing to the lower prices and more active work on the part of the dealers Very little range business is being done in St. Louis.

Lamps.—Owing to the slack industrial demand sales ar somewhat less than normal, though the recent price reduction has aided buying.

Safety Switches.—Particularly good demand is found for a new type of two-wire entrance switch, which is selling for $1 retail. All other entrance switches are selling well, but there is very little call for the industrial styles. A representative type of three-wire entrance switch is selling for $1.88.

Wire.—The demand for the small sizes of rubber-covered is maintained. A representative quotation this week is $6.30 per 1,000 ft. in 10,000-ft. lots. In the industrial sizes, especially 250,000-circ.mil and larger, virtually no sales are being made. There was a small demand during the week for weatherproof wire. The base on weatherproof and bare is from 15½ cents to 16 cents per pound. Ample stocks are found in all but No. 14 rubber-covered, where some are scant.

Dry Cells.—Strong demand continues, with the regular cell quoted at 31 cents and the igniter at 32 cents, both in barrel lots. Dealer stocks are rather low, but ample stocks are in the hands of the jobbers.

Metal Molding.—Though municipal wiring requirements are conducive to better demand, the small amount of construction work has kept the volume of sales low. Stocks are light but complete. The three-wire size is being priced at $5.70 per 100 ft.

Motors.—Some improvement in the call for fractional sizes is found, but their movement is still quiet. Further improvement in sales of sizes from 5 hp. to 50 hp. is reported for the week.

SAN FRANCISCO

Business is steadily improving, and it is noticeable that even in the Mission district of San Francisco, where most of the union men affected by the long building strike live, there is a better retail business. All dealers report a marked increase in the number of small jobs, evidently because of the new lower labor charge of $1.75 an hour. A rail strike would cause a serious dislocation of business to the Pacific Coast, which depends upon Central and Eastern factories for its supplies and whose manufactures are not in their sum total well proportioned.

Los Angeles is increasing its headlong rate of building, while San Francisco shows a normal increase over last year. The following fiures for building permits for September, 1921, are self-explanatory: San Francisco, $2,577,889; Los Angeles, $8,303,665; Oakland, $1,478,739. The corresponding figures for September, 1920, were: San Francisco $2,053,446; Los Angeles, $7,231,440; Oakland, $798,169.

Ironers.—The average ironer now retails for from $150 to $170, there having been a drop of about 10 per cent. There is a marked increase in the popularity of electrically heated ironers.

Heating Devices.—There is a temporary slump in sales, especially for higher-grade irons. Some small disk stoves are being featured because of their price. There is also an increase in waffle-iron sales, and this device has now become a regular instead of a rather special stock iron for the dealers. Toasters and percolators are moving rather slowly.

SALT LAKE CITY—DENVER

The old characterization of business conditions, "about the same," has clearly given way to the more hopeful response, "showing slight improvement." The change in comment is so universal as to warrant a belief that we have passed the lowest point of depression and are now slowly on the upward trend. Better times are reflected in a slight easing of the money market, better liquidation of outstanding paper and a freer tendency to buy on the retail market. As a consequence of the better demand retail electrical merchants are stocking in better quantities, affording a much-needed relief to jobbers. A summary of the metal market, so important in this region, shows some encouraging features this week.

Vacuum Sweepers.—The fall sales and advertising campaigns are stimulating considerable trade. Dealers still confine their orders to small consignments, three to six sweepers being the average number. Stocks are more than ample. Prices show a tendency to hold.

Washers.—Recent reductions on the retail prices of washers average about 10 per cent. The market is somewhat disappointing. Many of the jobbers are overstocked.

SEATTLE—PORTLAND—SPOKANE

The one outstanding event of the week was the meeting in Seattle of the port authorities of America. One of the concrete results of interest to the West Coast which seems fairly well assured is the linking of the Eastern and Western ports and their proper development for the economical handling of Western lumber shipped East via the canal route. Lumber during the past two weeks has experienced the most active market of the past two years. Lumbermen generally, however, are not inclined to the opinion that this improved condition will be lasting.

Of particular interest in electrical circles was the opening of the first "Home Electrical" in the Northwest, under the direction of the Northwest Electrical Service League, in Astoria, Ore., on Oct. 15. Electrical interests of Portland report the volume of business as continuing good. The rainy season has started and is acting as a stimulus in the movement of lamps, air heaters and other seasonal goods. Jobbers of Seattle continue to be optimistic and seem well satisfied with the trend of business in electrical supplies. The number of sales is showing a healthy increase, as is also the total volume of business. Orders are for the most part small, with large single orders conspicuously absent. Collections, which follow sales closely, are slightly better.

Prices have remained steady during the week, with copper showing a tendency to strengthen further. Bare copper in large sizes is reported difficult to get since manufacturers are inclined to look for a better market. Ironers are moving well. Portland jobbers report a scarcity of No. 14 rubber-covered wire. A slight price advance has been put into effect.

Contractors of Portland report business good, the greatest activity being in residence wiring and wiring of the smaller business places, although some large jobs are in prospect. Competition is very keen on medium-sized jobs, and contracts are being made on a very small margin. One contractor says that the average residence being wired at present has from six to eight baseboard receptacle outlets and that, owing to the demand for more convenience outlets as well as more lighting and switch outlets, a residence wiring contract is no longer a single-coil job. Dealers find business improving somewhat.

Manufacturers' Activities

Devoted to the Business Side of Manufacturing, Distribution and Sales, News from Jobbers and Foreign Fields and a Record of New Devices and Trade Literature

I. R. Nelson Company Opens New Department

The I. R. Nelson Company, Bond Street, Newark, N. J., announces the opening of a new department for the sale of electrical supplies to industrial concerns. The company will handle electrical supplies including wire, fuses, brushes, friction tape, insulating materials, sockets, Mazda lamps, etc. The company also does an electrical repairing and manufacturing business.

Manufacturers' Representatives Discuss Motors

More than 100 central-station men, contractor-dealers and industrial-plant electrical department employees from points in southern New Hampshire met at the Chamber of Commerce Rooms, Manchester, N. H., on the evening of Oct. 5 to listen to talks on various aspects of motor design and application by Leon E. Smith, George A. Wortman and E. A. Hancock of the General Electric Company. E. C. Foster, president of the Manchester Traction, Light & Power Company, welcomed the delegation to Manchester, and George H. Sander, commercial manager of the company, presided. Following the addresses the motion-picture reels "The Conquest of the Forest" and "The Light of a Race" were shown under the direction of M. R. Griffeth.

Employee Training Plan Perfected by Penn State College

Pennsylvania State College has worked out a plan for employee training which appears nearer to the ideal than anything yet attempted. The methods adopted by this institution have long since passed the experimental stage and are in operation in a large number of plants in Pennsylvania, where it has been demonstrated that an efficiency far beyond that of ordinary class instruction can be obtained.

For ten years past a staff of highly trained men in industrial education has been maintained at the college, and large sums of money have been spent in studying methods of conducting apprentice schools and night classes in the industries. This staff, known as the engineering extension division of the college, has personally organized and operated hundreds of classes in the best-known plants in Pennsylvania, such as iron and steel, electrical equipment, machines and tools, automobile parts, textiles and others common to the state. Each such enterprise was accompanied by an intensive study as to the characteristics which entered into its success or failure. The natural result has been that improved methods were continually adopted until it can now be virtually assured that a company can inaugurate a general training policy with far more success than is generally believed possible.

Special textbook material has been prepared for shopmen. The lessons were prepared after an intensive study as to requirements and cover almost every subject which has a daily use in industry. Upward of thirty lesson pamphlets have been prepared and are not only being used widely by the shops but by school boards, Young Men's Christian Association classes and other organizations having an interest in the educational welfare of their community. This lesson material is available at almost cost price to any who are interested in industrial education.

A. L. Cushman Buys Back Cushman Electric

On Oct. 15 A. L. Cushman consummated the purchase of the Cushman Electric Company, Concord, N. H. As was noted in the Aug. 20 issue of the ELECTRICAL WORLD, A. L. Cushman had then become vice-president, Garrett M. Ross president and Alexander P. Achimore manager of the newly organized company, continuing the name of Cushman Electric Company.

Mr. Achimore's health recently has been such that it has been necessary for him to retire from business for the time being, and both he and Mr. Ross have sold their interests in the company to Mr. Cushman. Mr. Achimore, however, expects to return to the power engineering department of the Western Union Telegraph Company on his recovery. Mr. Ross is continuing his business as formerly at 255 Greenwich Street, New York City. The special products of the Cushman Electric Company are motors for typesetting machinery and motor-generator sets for telegraph use.

Westinghouse Lamp in Midst of Store-Lighting Campaign

The Westinghouse Lamp Company, 165 Broadway, New York City, has put on an extensive sales campaign for the period of Oct. 15, 1921, to Jan. 1, 1922, under the title "Restoring the Store." This competition is open to all salesmen of the Westinghouse Lamp Company and is put on to stimulate lamp sales in stores now wired by improving and increasing the illumination, to introduce electric lighting in stores now using other forms of illumination, to improve and install new equipment for show-window lighting and to increase intensities of store lighting to 5 to 12 foot-candles. The company states that in a survey in a metropolitan center the fact was revealed that out of 23,000 stores of various kinds, 25 per cent have a lighting intensity of more than 5 foot-candles. Only 6 per cent of the stores have intensities of illumination of 8 to 12 foot-candles. From this it is taken that eleven out of every twelve stores offer opportunities for the electrical contractor-dealer.

The mediums which the salesmen will use are circular letters, newspaper advertisements, window displays and personal contact. Preliminary arrangements comprise contact with B agents, A agents, the central-station company and the fixture manufacturer. The advertising activity comprises a portfolio illustrating and describing the mailing program of the agents, including window display, blotter, folder, lantern slide, newspaper electros, circular letter campaigns and newspaper advertising. The sales activities comprise agents' canvass of stores, assistance by the Westinghouse Lamp Company and demonstrations and trial installations. Much of the success of the campaign depends upon the co-operation between the Westinghouse salesmen, the B agents and the A agents served by the B agent.

The advantages pointed out to the A agent are an increase in the sale of lamps and other electrical material, the attracting of more attention and prestige to his establishment and greater publicity for his services. The answer to the campaign, of course, will not be limited only to increased sale of lamps but also to increased sale of store and window-lighting equipment and wiring devices entering therein.

Export Association Opposes American Valuation Plan

The American valuation plan as part of the proposed tariff bill came in for its share of criticism during the sessions of the American manufacturers' Export Association held at the Waldorf-Astoria in New York City on Oct. 5 and 6. Considerable discussion took place on this phase of the tariff bill, which was the subject assigned to Thomas J. Doherty of the National Council of American Importers and Traders. The other side of the question was championed by Judge John F. Zoller, General Electric Company. As an outcome, however, a resolution was adopted opposing the American valuation measure on the ground that, being a new system, it would add to already unsettled world conditions.

"How to Retain and Increase Export Trade" was the theme of the convention, and among the topics discussed were "Some Present-Day Conditions in Argentina, Brazil and Uraguay," "Problems of Exchange," "Foreign Credits and Investments" and "Our Relation to the Present European Situation." Special attention was given to the tariff with Cuba, and a resolution

was adopted recommending to Congress and to the Secretary of State a most careful consideration of the effect on trade between the United States and Cuba of an undue increase in the tariff.

For the coming year the following new officers were elected: President, Myron W. Robinson of the Crex Carpet Company; vice-presidents, H. S. Demarest of Greene, Tweed & Company, J. S. Lawrence of Lawrence & Company, E. M. Heinz of the Fort Dearborn National Bank, Frank H. Taylor of the S. S. White Dental Manufacturing Company, Julius Goslin of the Jubert & Goslin Machine and Foundry Company, and V. H. Pinckney of the California Packing Company; treasurer, Philip B. Kennedy of the First Federal Foreign Banking Association.

For a period of three years the following directors were elected: W. S. Gavin, E. I. du Pont de Nemours Export Company; J. Walter Drake, Hupp Motor Car Corporation; M. A. Oudin, International General Electric Company; F. K. Rhines, General Fireproofing Company, and E. W. Droosten, Robbins & Myers Company.

Westinghouse Establishes Branch at Huntington, W. Va.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is planning to establish a new branch at Huntington, W. Va., to supply the demands of its patrons in the states of West Virginia, Ohio, Kentucky and Tennessee. This branch will occupy a three-story building, 100 ft. square, located at the corner of Ninth Street and Second Avenue.

Appleton Electric Takes Over Anderson Company

A. I. Appleton of the Appleton Electric Company, 1703-13 Wellington Avenue, Chicago, manufacturer of boxes, bushings, fuses, etc., has acquired the controlling interest in the Anderson Electric & Equipment Company, 154-160 Whiting Street, Chicago, from B. J. and O. E. Grigsby. Among the products of the Anderson company are the "Auto-Reelite" and "Reelite" extension auto iobile and electric lighting devices.

Schedule Out on Electric Motors for Gaseous Mines

Information regarding the conditions under which electric motors designed for use in gaseous mines may be submitted by manufacturers for testing by the United States Bureau of Mines is contained in Schedule 2-B, "Procedure for Establishing a List of Permissible Electric Motors," which has just been issued. The Bureau of Mines is prepared at its Pittsburgh experiment station to conduct tests of motors and their electrical accessories, such as are used in gaseous mines to operate conveyors, coal-cutting machines, electric drills, pumps, coal-loading apparatus and similar equipment, for the purpose of determining the permissibility of such motors and their accessories and approving them as permissible for use in gaseous mines or dust-laden atmospheres. Copies of the schedule may be obtained by addressing the Director of the Bureau of Mines, Washington, D. C.

Westinghouse Lamp B Agents to Hold Second Meeting

When the second meeting of the B agents of the Westinghouse Lamp Company was called at the factory in Bloomfield, N. J., on Oct. 5, to extend over the succeeding two days, it was found that B agents from as far west as Waterloo, Iowa, and even Portland, Ore., were present. The attendance at the meeting numbered forty-six. The principal result of the meeting was the vote of confidence in the stability of the lamp business which was given by those present and the assertion by virtually all of the representatives that their lamp business had fallen off less than any business which they handled.

MANY SECTIONS OF COUNTRY REPRESENTED AT WESTINGHOUSE LAMP B AGENTS' MEETING

Special emphasis was put upon stock turnover of lamps. Although these are a consigned commodity, they are considered the sugar of the trade, and energy must be spent to turn them over the maximum number of times possible in a year. To facilitate the maintenance of stock, the company has discontinued its scattered warehouses, and it is now concentrating its lamp stocks at Bloomfield, Indianapolis and San Francisco.

In the education of the dealer in lamp activity it was brought out that the jobber was the actual educational factor in this work and that it was up to him to help out his dealers in building up their lamp market. In the publicity line it developed that it would be necessary in the future for dealers to be more explicit in their orders for dealer help in advertising.

Too much has been taken for granted in lamp sales, and much of the business is being allowed to drift in of its own momentum. In order to get the real business the jobbers' salesman must act as lamp salesman and must really know illumination.

A New Line of Wiring Devices Brought Out By the General Electric Company

A new line of wiring devices comprising several types of switches and connectors for household electrical appliances and motor-driven devices has been developed and placed on the market by the General Electric Company, including a compound through-cord switch; a new miniature single-pole flush tumbler for use on motor-driven devices, such as automobile lighting and ignition systems, washing machines, adding machines, signals, etc.; a miniature cord connector for use wherever a small separable connection is desired on motor-driven devices; a series tap connector, which is particularly applicable for attaching electrically-operated sewing machines; an attaching plug for connecting the cord in the handle of vacuum cleaners to the motor; a motor plug for use in the body of motors; the G. E. thumb button switch, adapted for vacuum cleaners, portable hand drills, vibrators, etc.

The F. D. Lawrence Electric Company, 219 West Fourth Street, electric supply jobber, has increased its capital stock from $50,000 to $300,000.

The Cutter Company, Philadelphia, manufacturer of the "Re-Lite" circuit breakers, announces that Maxwell B. Cutting, formerly of its Chicago office, has established a branch at 1318 Chemical Building, St. Louis.

G. E. Wise, Detroit, dealer in electric equipment, has removed his office from 845 Book Building to the General Motors Building.

Foreign Trade Notes

THE EUGENE F. PHILLIPS ELECTRICAL WORKS, LTD., Montreal, Que., manufacturer of copper electric wire, are planning to erect a plant at Brockville, to cost about $3,000,000. The proposed plant will utilize 3,000 electrical horsepower and will give empoyment to about 600 people.

GERMAN COMPETITION IN ELECTRICAL GOODS IN PERU.—Electrical goods are suffering slightly from German competition in Peru, according to an economic report submitted by Trade Commissioner W. E. Dunn from Lima, under the date of Aug. 29, in which he states that German competition in regard to electrical goods, and especially in heavy industrial machinery, does not seem to be serious. Prices offered are a little more favorable, if any, than those of American manufacturers, but there does not seem to be sufficient reason for dealers to change to German goods. American machinery has a very good reputation in Peru and is generally considered superior to the German product. Two notable exceptions, however, are known where German firms have secured two large contracts; one for new equipment for the Paramonga Sugar Estate, the business involved amounting approximately to $300,000; the other a contract for hydro-electric equipment for the Sociedad Industrial de Huancayo, amounting to about $60,000. In both cases the German quotations were considerably under the lowest American bid.

INTERNATIONAL ELECTRICAL EXHIBITION AT AMSTERDAM, HOLLAND. —An international electrical exhibition will be held at Amsterdam, Holland, from Nov. 25 to Dec. 26, 1921. The exhibition is organized by the Amsterdam Department of the Netherlands Society of Electrotechnical Employers, its committee having been formed under the patronage of the Dutch government. It will be divided into the following sections: generation and transmission of electricity, electric lighting, electrolysis, heating, installation material, traction and transport, electric apparatus in all varieties, for domestic purposes and small industry, telegraph and telephone, medical instruments, education and statistics. Further information can be secured from the Bureau of Foreign and Domestic Commerce by referring to file No. 48,523.

INCREASING DEMAND FOR ELECTRICAL EQUIPMENT IN INDIA.—According to R. A. Lundquist, chief of electrical division, the use of electrically driven machinery is rapidly increasing in India. On the west coast the cotton mills, which center about Bombay, are being equipped for electrical operation in conjunction with the construction of a large hydro-electric system. On the east coast, in the vicinity of Calcutta, the jute industry with its numerous large mills is turning to electric drive, and in addition to individual mill installations several groups of mills are planning or have under way several power schemes. One of these projects, which is to supply a group of mills, contemplates a central station with an ultimate capacity of 40,000 kw.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

An inquiry has been received from a business man in Canada (No. 150) for the purchase of serviceable street-lighting lamps and gas street-lighting appliances.

TENDERS FOR ELECTRIC PLANT FOR HUMANSDORP, SOUTH AFRICA.—Tenders will be received by the town clerk. Corporation of Humansdorp, Cape Province, South Africa, until Nov. 30, for construction of an electric light plant including water turbine and generator, switchboard, accumulators, etc.; material for street lighting system with overhead distribution; ferro-concrete pipe line, concrete tank and buildings.

PROPOSED ELEVATED ELECTRIC RAILWAY IN OSAKA, JAPAN. — The Osaka Hanshin Kyuko Electric Railway Company, which operates a railway between Osaka and Kobe, according to *Electrical Industries*, is planning to construct an elevated electric railway between Osaka and Juso, and also to double the present lines, at a cost of about 3,000,000 yen. The company also contemplates building an underground railway from its Kobe terminus to Motomachi, to cost approximately 7,500,000 yen.

MUNICIPAL ELECTRIC PLANT PLANNED FOR KYOTO, JAPAN.—The construction of a large electric power station (steam-driven) to cost about 4,300,000 yen, to be completed within three years is under consideration by the municipality of Kyoto. The equipment will include two generators of 5,000 kw. each.

ELECTRIC LIGHTING SYSTEM FOR SAN FERNANDO, TRINIDAD.—Plans are under way to inaugurate an electric lighting system, according to Consul Henry D. Baker, Trinidad, in the town of San Fernando, Trinidad, as soon as possible. At present kerosene lamps are used for lighting, except in the case of larger buildings, which have individual electric lighting plants. Complete specifications as furnished by the town engineer of San Fernando are on file in the office of the Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., and copies may be obtained by referring to file No. 37,302.

PROPOSED NEW POWER PLANTS IN ITALY.—The erection of a series of three power stations in connection with three groups of mines has definitely been decided upon by the Associated Miners Company of Siena, Italy. Lignite is to be used for fuel, and part of the total capacity will be in steam units and part in producer-gas sets. Further information may be obtained by addressing L'Unione Esercenti Miniere di Siena, Siena, Italy.

New Apparatus and Publications

VIBRATOR—The P. A. Geier Company, Cleveland, announces a new "special" model of its royal vibrator.

X-RAY APPARATUS—The International X-Ray Corporation, 326 Broadway, New York City, has issued a technical paper by Montford Morrison, chief consulting engineer, on "A Precision X-Ray Apparatus," describing the company's latest improvement in X-ray interruptionless rectifying apparatus.

IGNITION TESTER—The Westinghouse Lamp Company, 165 Broadway, New York City, is marketing a neon-tube "Spark-C" ignition tester for gasoline engines.

SWITCHBOARD METERS—The Sangamo Electric Company, Springfield, Ill., has issued bulletin No. 57 (suspending No. 49) on "Switchboard Meters, Alternating-Current, Direct-Current and Ampere-Hour."

ASBESTOS INSULATION—The De Ferroized Asbestos Corporation, Railway Exchange Building, Chicago, has developed a sheet asbestos for insulation purposes.

GRINDER—Forbes & Myers, Worcester, Mass., has placed in the market a new small motor-driven grinder for general light work.

HYDRAULIC TURBINES — Publication 1640-A, entitled "A New Type of Hydraulic-Turbine Runner for Low-Head Developments," has been issued by the Allis-Chalmers Manufacturing Company, Milwaukee.

UPHOLSTERY CLEANER—The Wisconsin Electric Company, Racine, Wis., has put on the market a new "Dumore" electric upholstery cleaner.

DRILL AND VALVE GRINDER—A combination electric drill and valve grinder has been put on the market by the Wisconsin Electric Company, Racine, Wis.

AIR HEATER—The Carmean Electric Company, Kansas City, Mo., has just placed on the market its new "Carmean" portable motor-driven air heater and fan.

FURNACE — The Repel-Arc Furnace Company, Indianapolis, Ind., has issued bulletin 301, on the "Repel-Arc Furnace."

STARTING SWITCH—The Allen-Bradley Company, Milwaukee, has issued bulletin J-1552, describing its new automatic starting switch for induction motors.

STORE LIGHTING—The Macbeth-Evans Glass Company, Pittsburgh, is distributing a folder entitled "Good Light for Stores."

TACHOMETER—The Jones hand tachometer, type H-2, is described in a bulletin of the Consolidated Instrument Company of America, 461 Eighth Avenue, New York City.

WASHING MACHINE — The Central Manufacturing Company, St. Louis, has perfected its "1922" model of "Humanity" electric clothes washer.

SCHOOL LIGHTING—"Macbeth-Monax for Modern School Lighting" is the title of a leaflet distributed by the Macbeth-Evans Glass Company, Pittsburgh, describing the Macbeth-Monax globes for lighting purposes.

TUBE WELDING MACHINERY AND FABRICATING EQUIPMENT—The Davis-Bournonville Company, Jersey City, N. J., is distributing a booklet covering its tube-welding machinery and fabricating equipment.

TOASTER.—The Security Electric Manufacturing Company, 1463 West Ohio Street, Chicago, has placed on the market an electric toaster stove with interchangeable tray and pan.

FIREPLACE HEATER. — The Sparling Electric Products Company, 195 Dearborn Street, Buffalo, has brought out an electric fireplace heater known as "Hotglow."

ELECTRIC WATER HEATER. — The Majestic Electric Development Company, 656 Howard Street, San Francisco, has placed on the market an electric instantaneous "Majestic" water heater of the portable type.

SHOE-SHINING MACHINE.—The Hermes Manufacturing Company, 448 North Wells Street, Chicago, has placed on the market an electric shoe-shining machine.

FARM-LIGHTING PLANTS. — A 1-kw. and a 1½-kw. farm-lighting and power plant has been placed on the market by the Main Electric Company, 1131 East One Hundred and Thirteenth Street, Cleveland.

AIR COMPRESSOR. — A small motor-driven air compressor of the automatic type has been placed on the market by the Olsen-Boettger Manufacturing Company, 108 East Third Street, St. Paul, Minn.

TIPLESS MINIATURE LAMP-SEALING MACHINE. — A tipless miniature lamp-sealing or splicing machine has recently been developed by Charles Eisler, 15 Kirk Place, Newark, N. J.

New Incorporations

THE GUARANTEED BATTERY MANUFACTURING COMPANY, New York, N. Y., has been incorporated with a capital stock of $150,000 to manufacture electric batteries and parts. The incorporators are P. Probst, D. Smith and E. Harris. The company is represented by Sidney Nordlinger, 489 Fifth Avenue.

THE SYRACUSE (N. Y.) OIL BURNER COMPANY has been organized by F. W. J. McKibbin, A. H. Mallory and R. H. Carhart, 623 Oneida Street, to manufacture oil-burning, electric and gas appliances. The company is capitalized at $600,000.

THE NEBO (KY.) LIGHT COMPANY has been incorporated by J. M. O'Bryan, L. J. Morrow, T. H. Smith and others. The company is capitalized at $3,000 and proposes to furnish electricity for lamps and motors.

THE CYNOSURE ELECTRIC ADVERTISING CORPORATION, New York, N. Y., has been incorporated with a capital stock of $12,000 to manufacture electric displays. The incorporators are E. and J. Rojo and S. S. Goldberg, 350 Broadway.

THE FARAD ELECTRIC COMPANY, New York, N. Y., has been incorporated with a capital stock of $15,000 to manufacture electrical specialties. The incorporators are F. Richold, F. Landau and W. Athenas. The company is represented by Barbieri & Zerilli, 313 West Forty-second Street.

THE TITAN MINIATURE LAMPS COMPANY, Orange, N. J., has been incorporated by George Anderson, A. E. Jackson and D. G. Littell, Bloomfield, to manufacture electric lamps. The company is capitalized at $100,000.

THE ELECTRICAL MERCHANDISING COMPANY, Chester, Pa., has been organized with a capital tock of $100,000 to manufacture electrical specialties. The incorporators are N. V. Reddington, John J. Reddington and George Shober. Chester L. P. Moore, 811 Shipley Street, Wilmington, Del., represents the company.

THE BLACKEY (KY.) LIGHT & POWER COMPANY has been organized with a capital stock of $10,000 by P. H. Persall and others to furnish electricity in Blackey for lamps and motors.

Record of Electrical Patents

Notes on United States Patents

(Issued Sept. 20, 1921.)

15,199 (Reissue). MOLDING COMPOSITION; James P. A. McCoy, Milwaukee, Wis. App. filed Nov. 13, 1920. Inert fillers united into solid mass by resinous binders.

1,390,984. CIRCUIT CLOSER FOR MUSICAL INSTRUMENTS; Ralph Conover and Leo Hull, Terre Haute, Ind. App. filed April 26, 1919. For pianos, etc.

1,390,998. SHOE-HEATING DEVICE; Thomas Lund, Beverly, Mass. App. filed Feb. 19, 1920. Heating shoe parts to soften or to dry them.

1,391,006. HALF-DUPLEX ALTERNATING-CURRENT TELEGRAPH SYSTEM; Ralzemond D. Parker, Brooklyn, N. Y. App. filed Sept. 8, 1919. Lines composited for Morse or other telegraph operation.

1,391,041. SIZING TESTER; Henry G. Boon, Appleton, Wis. App. filed Aug. 23, 1920. For testing the character of paper.

1,391,046. LIGHTNING ARRESTER; Wallace L. Cook, Chicago, Ill. App. filed Sept. 12, 1919. Cross-arm arrester of the air-gap type.

1,391,085. TROLLEY WHEEL; John A. Wendell, Montgomery, W. Va. App. filed March 7, 1921. Portions subjected to wear are readily removable.

1,391,089. STORAGE BATTERY; Edward S. Adams and Walter H. Adams, Columbus, Ohio. App. filed July 12, 1920. An improved connection.

1,391,093. METER; Joseph W. Bickel, Chicago Heights, Ill. App. filed Jan. 28, 1921. Maximum-demand meter.

1,391,113. ELECTRIC HEATER; Andrew J. Holmes, Tacoma, Wash. App. filed Aug. 27, 1920. Uniform heating of air.

1,391,135. SEMI-AUTOMATIC TELEPHONE SYSTEM; George E. Mueller, Aurora, Ill. App. filed Nov. 16, 1907. Simple means for distributing incoming calls.

1,391,136. TELEPHONE-EXCHANGE SYSTEM; George E. Mueller, Aurora, Ill. App. filed June 20, 1908. Automatic and semi-automatic systems.

1,391,137. WIRE SPLICER; Joseph O. Mulligan, McKee's Rocks, Pa. App. filed April 30, 1921. For application to overhead trolley wires.

1,391,191. TROLLEY GUARD AND FINDER; Patrick J. Kelley, Detroit, Mich. App. filed June 14, 1921. Can be mounted on the existing trolley.

1,391,206. TELEGRAPHIC INDICATOR; Sherman G. Nye, Denver, Col. App. filed Oct. 23, 1919. Indicator for telegraphic instruments.

1,391,211. DRY-CELL MATERIAL AND METHOD OF MANUFACTURE; Otto E. Ruhoff, Madison, Wis. App. filed Jan. 31, 1920. Constituent of depolarizing material.

1,391,241. LOCKOUT RELAY; George A. Burnham, Saugus, Mass. App. filed Dec. 8, 1917. Prevents closing oil switch under overload conditions.

1,391,244. TYPEWRITER ATTACHMENT; Guillermo Castellanos, Los Angeles, Cal. App. filed July 2, 1919. Traveling solenoid for moving the carriage.

1,391,289. REGENERATIVE MOTOR-CONTROL SYSTEM; Samuel T. Webster, St. Louis, Mo. App. filed April 7, 1911. Regenerated current automatically controlled.

1,391,295. MOTOR-CONTROLLER; Thomas E. Barnum, Milwaukee, Wis. App. filed July 23, 1917. For starting a polyphase motor.

1,391,296. ELECTRIC IRON; Reuben B. Benjamin, Chicago, Ill. App. filed Dec. 8, 1919. Means for automatically opening the circuit.

1,391,393. CONNECTOR; Harry A. Douglas, Bronson, Mich. App. filed Aug. 9, 1917. Edisonian socket.

1,391,370. SUPPORT FOR TELEPHONE RECEIVERS; Charles M. Clarke, Sewickley, Pa. App. filed Aug. 13, 1918. To obviate necessity of waiting to replace receiver in fork after call has been answered over another instrument.

1,391,377. CURRENT-GENERATING PLANT; Oliver P. Fritchle, Denver, Co. App. filed Nov. 15, 1920. For supporting a plant on windmill, whose wheel drives the generator.

1,391,387. TROLLEY FINDER; Ludwik Karandyszewski. Schenectady, N. Y. App. filed May 5, 1921. Spiral-cam trolley wheel.

1,391,392. TROLLEY-RESTORING MECHANISM; George A. Lafontaine, Los Angeles, Cal. App. filed Nov. 7, 1918. To catch on wire whenever the trolley wheel jumps.

1,391,400. ORE SEPARATOR; John J. Neville, Clifton Forge, Va. App. filed June 18, 1921. For separating iron ore from non-magnetic materials.

1,391,442. CALL-SENDING DEVICE; Albert Andersen, Chicago, Ill. App. filed Aug. 8, 1914. Impulse transmitters controlled by a single keyboard.

1,391,507. METHOD FOR THE PRODUCTION OF IRON AND STEEL; Elfego Riveroll, Los Angeles, Cal. App. filed May 11, 1920. For electrical smelting of iron sponge.

1,391,522. ELECTRIC CONTROLLER; Richard Amberton, London, England. App. filed March 3, 1920. For cutting in or out resistances in electric circuits.

1,391,529. ELECTRICAL DRIVING; Henry Crochat, Paris, France. App. filed Aug. 17, 1916. For the driving wheels of motor vehicles.

1,391,552. REPEATER CORD CIRCUITS; Owen H. Loynes, Woodbridge, N. J. App. filed Sept. 23, 1919. Supervisory signaling arrangements.

1,391,576. INSULATING UNIT FOR ELECTRIC SUSPENSION CHAINS; Lucien E. T. Perrin, Paris, France. App. filed Oct. 22, 1920. For high-tension lines.

1,391,586. ELECTRIC TRANSLATOR; Frank M. Slough, Rochester, N. Y. App. filed June 23, 1917. Movement of electric switches.

1,391,587. SUBSCRIBER-OPERATED TELEPHONE SYSTEM; Frank M. Slough, Rochester, N. Y. App. filed Jan. 28, 1918. Automatic switches.

1,391,588. TELEPHONE-SERVICE SYSTEM; Frank M. Slough, Rochester, N. Y. App. filed Nov. 1, 1918. Selective indication and registration.

1,391,622. COMBINED FIRE-ALARM BOX AND HYDRANT; Edward E. Ferguson, Portsmouth, Va. App. filed Nov. 18, 1919. Avoids opening valve without turning in alarm.

1,391,631. EXTENSION ELECTRIC LIGHT FIXTURE; Alfred F. Hammersmith, Chicago, Ill. App. filed Aug. 6, 1918. Adjustable reel.

1,391,652. ELECTRICAL TRANSMISSION SYSTEM; Elemer Meitner, Brooklyn, N. Y. App. filed Oct. 3, 1917. Step-by-step or impulse transmission systems.

(Issued Sept. 27, 1921.)

1,391,671. THERMIONIC VALVE FOR USE IN WIRELESS TELEGRAPHY AND TELEPHONY; Horace St. John de Aula Donisthorpe, London, England. App. filed March 23, 1921. Hollow hemispherical plate and grid electrodes in combination with a straight or loop filament.

1,391,672. ELECTRICAL CONDENSER; William Dubilier, New York, N. Y. App. filed Aug. 1, 1918. To decrease as much as possible leakage between adjacent plates.

1,391,673. ANTENNA-SHORTENING DEVICE; William Dubilier, New York, N. Y. App. filed March 7, 1919. For inserting capacity to shorten wave length.

1,391,684. ALARM APPARATUS; Aage H. Jorgensen, Lyngby, near Copenhagen, Denmark. App. filed April 11, 1919. For use in connection with previously installed telephone lines.

1,391,741. TROLLEY WHEEL; Christian E. Liebenberg, Essington, Pa. App. filed July 22, 1920. Guard to keep contact member in the neighborhood of the wire and facilitate its restoration.

1,391,762. THERMOMAGNETIC THERAPEUTIC APPLIANCE; John H. Dequer, Kansas City, Mo. App. filed May 1, 1920. To provide both a magnetic field and a heating zone.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

SKOWHEGAN, ME.—Work will be completed this fall on the high-tension transmission line of the Central Maine Power Company from Skowhegan to Guilford. The company also plans to erect a line from the mills of the General Slate Company in Monson to the plant of the Monson Slate & Product Company in Blanchard.

TORRINGTON, CONN.—Plans are being prepared for the installation of an ornamental lighting system in the business section of Torrington, to cost between $13,000 and $17,000.

Middle Atlantic States

PENN YAN, N. Y.—An appropriation of $24,000 has been authorized to provide for extensions to the municipal electric light plant.

ROSSIE, N. Y.—The Rossie Electric & Manufacturing Company is considering improvements to its plant and system, including the installation of a 250-kw. generator, an additional waterwheel, and the erection of transmission lines. The present building is adequate to accommodate the new machinery.

JERSEY CITY, N. J.—Plans are under consideration for the construction of a new one-story power house at the Brunswick Laundry, 222 Tonnelle Avenue.

NEWARK, N. J.—Bids will be taken at once, it is reported, by the Igoe Brothers, Poinier Street, manufacturer of wire nails and other wire products, for the construction of a one-story addition to their plant. A power house will also be built.

VERONA, N. J.—The installation of a new refrigerating plant at the Essex Mountain Sanatorium at Verona, to cost about $60,000, is under consideration.

ASHLAND, PA.—Arrangements are being made by the Lehigh Valley Coal Company for the installation of an electrically operated, 3,000 gallons per minute pumping unit at its Buck Mountain mine, near Mahonoy City.

HARRISBURG, PA.—Plans are being prepared by the Harrisburg Railways Company for an addition to its power plant, to cost about $75,000.

HARRISBURG, PA.—The Union Ice & Coal Company, Forster Street, is considering the construction of a new ice-manufacturing plant, to cost, with machinery, about $200,000. The company also contemplates the construction of a cold storage plant.

LANSDALE, PA.—Application has been made by the Philadelphia Suburban Gas & Electric Company to the Public Service Commission for permission to extend its system to Lansdale. At the present time the section is being served by the municipal electric plant.

PHILADELPHIA, PA. — The Forrest Laundry, 1225 Columbia Avenue, it is understood, contemplates the construction of a power and mechanical laundry at 1704-12 North Fawn Street.

PITTSBURGH, PA.—Arrangements have been made by the West Penn Power Company for an issue of $1,500,000 in bonds for its subsidiary, the Allegheny Pittsburgh Coal Company, the proceeds to be used for extensions, etc.

SMETHPORT, PA.—J. C. Backus is reported to have organized a company for the purpose of erecting a transmission line from the power plant at Portville, N. Y., to Smethport, Pa., to furnish electricity in the latter village.

WILKES-BARRE, PA.—The Pennsylvania Power & Light Company has purchased the property of the Wilkes-Barre Company. Surveys are under way preliminary to the construction of transmission lines to connect the Wilkes-Barre plant with the high-

tension system of the Pennsylvania Company. William H. Conyngham is president and E. A. Wakeman is general manager of the Wilkes-Barre Company.

BALTIMORE, MD.—The Cooknut Corporation, Paca and Lexington Streets, is planning the construction of a one-story powerhouse to be used in connection with its proposed plant for the manufacture of lard substitutes, to cost about $85,000.

DORFEE, W. VA.—Plans are under consideration by the Kanawha White Ash Collieries Company for the installation of electrical and other machinery at its properties. E. M. Burns, Ebensburg, Pa., is president.

FAYETTEVILLE, W. VA.—Application has been made by C. B. Hawley, 450 Munsey Building, Washington, D. C., and associates for permission to build a hydro-electric generating plant at Sandstone Falls, on the New River, at Fayetteville, W. Va. The initial capacity of the plant will be about 4,000 hp.

YORKTOWN, VA.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., is having plans revised for additions to the power plant at Yorktown, Va., including the installation of new equipment. New bids will be called for at an early date.

WASHINGTON, D. C.—Bids will be received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., for furnishing the following: Until Oct. 25, circular PR-4754-A-1CP, 750 hand generators. Until Oct. 26, circular PR-8723-2CP, 2,000 ft. 12 pair armored rubber insulated subterranean cable and 6,000 ft. 25 pair paper insulated submarine cable; circular PR-7500-1CP, 9,400 dry batteries SC type BA-1. Until Oct. 28, circular PR-8771-1CP, one 3-unit, 5-kw. motor generator set, motor to be 15 hp. For further information address as above.

North Central States

GRAND RAPIDS, MICH. — Plans are under way for the installation of an electric lighting plant in Hotel Pantlind, to be operated in connection with its heating plant. The cost is estimated at $40,000.

NILES, MICH.—Work has been started on the construction of a new power house at the plant of the French Paper Company, to cost, with equipment, about $75,000. J. Parker is manager.

OTSEGO, MICH.—Plans are being prepared by the Mac Sim Bar Paper Company for the construction of a one-story power plant, 80 ft. x 140 ft., to cost about $300,000, including machinery. Billingham & Cobb, Press Building, Kalamazoo, are architects. A. B. Thomas is president and general manager.

CLEVELAND, OHIO—The City Council has authorized the installation of electric lamps on sections of East Sixty-fourth and East Sixty-sixth Streets, Worsley Avenue from East Sixty-fourth to East Seventy-first Street, Gertrude Avenue from East Fifty-seventh to East Sixty-fifth Street, and on Hosmer Avenue from East Fifty-seventh to East Sixty-Fifth Street.

CLEVELAND, OHIO—The City Council has authorized an issue of $40,000 in bonds, the proceeds to be used for the construction of electric light works in connection with the municipal lighting system.

LAKEWOOD, OHIO—The City Ice & Fuel Company, East Twenty-second Street, Cleveland, has had plans prepared for the construction of a one-story ice manufacturing plant at Fisher and Warren Roads, Lakewood, to cost about $100,000.

PIKEVILLE, KY. — The Kentucky & West Virginia Power Company, Land Title Building, Philadelphia, Pa., is planning the construction of an additional power house in the Big Sandy District, and the erection of transmission lines from this point and high-tension tie lines to connect with other power houses. Francis R. Weller, Hibbs Building, Washington, D. C., is consulting engineer.

BEDFORD, IND.—The local plant of the Interstate Public Service Company was recently destroyed by fire. Arrangements have been made to obtain electricity for light and power service from Seymour, Ind., until a new plant can be built.

SPRINGFIELD, ILL.—The Springfield Gas & Electric Company is contemplating extensions and improvements. The company was recently granted a twenty-year extension to its franchise. A. D. Mackie is general manager.

ANTIGO, WIS.—Arrangements have been made, it is understood, by E. A. Forbes of the Rhinelander (Wis.) Electric Light & Power Company for the purchase of the plant of the Antigo Electric Company. Mr. Forbes contemplates the erection of a high-tension transmission line from Rhinelander to Antigo next spring. The transmission line will also serve to provide emergency service for Rhinelander from the steam power plant in Antigo.

EAGLE RIVER, WIS.—The Village Board is considering the installation of a new generator in the municipal electric power plant and other city improvements, to cost about $18,000.

GILLETT, WIS.—The Northern Wisconsin Power Company, recently incorporated with a capital stock of $75,000, contemplates the erection and operation of hydro-electric generating plants. J. A. Read, A. L. Kreutzer and W. C. Smith are interested in the company.

MILWAUKEE, WIS. — The American Hide & Leather Company, 658 Commerce Street, is contemplating the construction of a tannery, including main building, power house and bark house, to replace the plant recently destroyed by fire, causing a loss of about $1,500,000.

MILWAUKEE, WIS.—Contract has been awarded by the Luick Ice Cream Company, 177 Ogden Avenue, to Theodore Stark & Company, 425 East Water Street, for the construction of a five-story addition, 60 ft. sq., to cost complete about $100,000. Additional generating equipment, refrigeration tanks, motors, etc., will be required. Brust & Philipp, 405 Broadway, are architects.

WAUKESHA, WIS.—Inquiries are being made by the Manitowoc Church Furniture Company, it is understood, for steam generating equipment for a power plant under construction to cost about $30,000 complete.

KANSAS CITY, MO.—Plans are being prepared by the Superior Ice Company, Lee Building, for the construction of a three-story plant at Second and Main Streets, to cost about $145,000, including machinery. A. L. Williams is interested in the company. B. B. Ryan, care of the company, is architect and engineer.

KANSAS CITY, MO.—The City Council contemplates improvements to the lighting system on Walnut, Tenth, Twenty-fourth and Twenty-seventh Streets and Prospect Avenue.

ST. LOUIS, MO.—Plans are under way by the Polar Wave Ice & Fuel Company, Grand and Olive Streets, for the construction of a new ice manufacturing plant to cost, including machinery, about $500,000. H. G. Clymer, Wainwright Building, is architect.

KANSAS CITY, KAN.—Plans have been prepared by the City Engineering Department for the construction of a power plant at the Quindaro pumping station for the waterworks system, to cost about $25,000. Ross & Peterson, Barker Building, are architects. Howard Payne is city clerk.

McCRACKEN, KAN. — Bonds to the amount of $35,000 have been voted for improvements to the municipal light and water plant.

WICHITA, KAN.—The Kansas Gas & Electric Company is considering increasing its output to 40,000 kw.

Southern States

CARTHAGE, N. C.—The power house at the plant of the Spencer Lumber Company was recently destroyed by fire. The building, it is understood, will be rebuilt.

CHARLOTTE, N. C.—Plans are under consideration by the City Council for extensions to the lighting system on Fourth Street. Electrical service is furnished by the Southern Power Company.

PERRY, GA.—The City Council is considering improvements to the light and water systems, to cost about $15,000.

SAVANNAH, GA.—The Savannah Electric & Power Company was recently organized with a capital stock of $4,800,000 to acquire and operate the power plants and property of the Savannah Electric Company. The company has also arranged for an issue of $1,750,000 in bonds, the proceeds to be used for extensions, etc. A. A. Lawrence is president.

LITTLE ROCK, ARK.—The Dixie Power Company, Title Guarantee Building, St. Louis, Mo., has applied for authority to construct a new hydro-electric generating plant on the Buffalo River, in the vicinity of Little Rock, Ark., to have an initial capacity of about 20,000.

RUSSELLVILLE, ARK.—The Council is considering the installation of a new street-lighting system in the business district.

ARDMORE, OKLA.—Plans are under consideration by the Magnolia Petroleum Company, Dallas, Tex., for the construction of a new gasoline manufacturing plant in the vicinity of Ardmore, Okla. The work will include the erection of an electric power plant. J. A. Nicholson, Heraldton, Okla., is engineer.

MANCHESTER, OKLA. — Bonds to the amount of $27,000 have been voted for the erection of a transmission line from Manchester, Okla., to Anthony, Kan. W. Blecha is city clerk. W. B. Rollins, Railway Exchange Building, Kansas City, Mo., is engineer.

CORPUS CHRISTI, TEX.—The Gulf Coast Power Company, recently incorporated with a capital of $100,000, it is reported, is considering establishing a central power plant. The present plans provide for rehabilitating an electric light and power plant and ice plant.

EDINBURG, TEX.—Bonds to the amount of $30,000 have been approved by the Attorney General's Department, Austin, for the installation of an electric light system in Edinburg.

WACO, TEX.—Plans are under consideration by the City Commission for the installation of a street lighting system on sections of the River Driveway and Washington Avenue.

Pacific and Mountain States

EVERETT, Wash.—Surveys are being made by the Puget Sound International Railway & Power Company in connection with a project to furnish electricity for light and power in the outlying districts.

OROVILLE, WASH. — The Okanogan Valley Power Company, Brewster, it is reported, is considering the installation of a second hydro-electric unit on the Simulkameen River next year. Eugene Enloe is president.

ALBANY, ORE.—The city authorities are planning extensive improvements to its fire-alarm system, which will require the installation of a motor-generator, batteries, switchboard and rewiring of the overhead circuits.

MILTON, ORE.—The town authorities have applied to State Engineer Cupper for permission to appropriate 82 sec.-ft. of water from Walla Walla River to develop 1,700 hp. under a head of 190 ft. The project includes a forebay, dam and pipe line.

ROSEBURG, ORE.—At an election to be held Nov. 1 the proposal to issue $500,000 in bonds for the purpose of acquiring a light, power and water system will be submitted to the voters.

LONG BEACH, CAL.—Plans are being prepared for the installation of a lighting system on Anaheim Street from Temple to Loma Avenue.

RED BLUFF, CAL.—An expenditure of $24,000 is planned by the Pacific Gas & Electric Company for improvements to its system in Red Bluff.

Canada

MONTREAL, QUE.—Plans are under consideration by the Commission of Electrical Services of the city of Montreal to resume work on the municipal underground conduit system.

VANCOUVER, B. C.—The mill of the Canadian Lumber & Timber Company, operated in the name of the Vancouver Export Lumber Company, was recently destroyed by fire, causing a loss, including machinery and power equipment, of about $125,000.

Miscellaneous

BOQUILLAS, MEXICO—The Canadian Power Company is contemplating extending its electric transmission system from its hydro-electric plant at Boquillas to a number of additional towns and mining districts. Below the water storage reservoir of the company are about 200,000 acres of land which are susceptible to reclamation by means of irrigation. The state and federal governments are considering the matter of building a system of canals and ditches to utilize the water from the dam to irrigate the lands and to colonize them.